

ANNUAL AUTO SECTION

50 Color Photos of the New Cars

POPULAR SCIENCE

OCTOBER • 35c *Monthly*

**BUICK
SPECIAL**



**PONTIAC
TEMPEST**



**OLDS
F-85**



3 new GM compacts get

FIRST

ALUMINUM

V-8

ENGINE



THE MAILMAN

REMEMBER THE MORNING I FOUND ANDY SHOLL TRYING TO TAKE ON THE WHOLE NEIGHBORHOOD...



ALL RIGHT, BOYS, WHAT'S THE TROUBLE?

THEY CALLED MY POP A "MUSCLE HEAD" JUST 'CAUSE HE NEVER FINISHED SCHOOL

ANDY! YOU'VE BEEN FIGHTING AGAIN! OH, IF ONLY WE COULD LEAVE THIS NEIGHBORHOOD

MAYBE THIS WILL HELP... IT'S FROM INTERNATIONAL CORRESPONDENCE SCHOOLS



SURE ENOUGH, WITHIN A FEW WEEKS I BEGAN TO DELIVER MORE LETTERS AND PACKAGES FROM I.C.S.

WE'RE KEEPING YOU BUSY THESE DAYS. ANDY'S FATHER IS TAKING A CORRESPONDENCE COURSE, YOU KNOW



A SMART MOVE FOR ANY MAN!

IT WASN'T LONG BEFORE I BEGAN TO NOTICE CHANGES IN THE SHOLL'S HOME. LITTLE THINGS. NEW CURTAINS. FLOWER BOXES. FRESH PAINT. AND THEN, ONE MORNING...

LOOK, MR. MCCURDY. HOW DO YOU LIKE OUR NEW CAR?

WOW! THAT'S A BEAUTY!



GOSH, ANDY, WILL YOUR POP TAKE US FOR A RIDE IN IT?

A FEW WEEKS LATER, MRS. SHOLL MET ME AS I CAME UP THE STEPS...

HAS ANDY TOLD YOU THE NEWS? WE'RE MOVING. MR. SHOLL IS BEING TRANSFERRED. HE'S TO BE A SECTION LEADER IN THE NEW MILDALE PLANT. HERE'S OUR NEW ADDRESS



WELL, I'M REAL HAPPY FOR YOU. BUT I'M GOING TO MISS ANDY-AND THAT I.C.S. MAIL



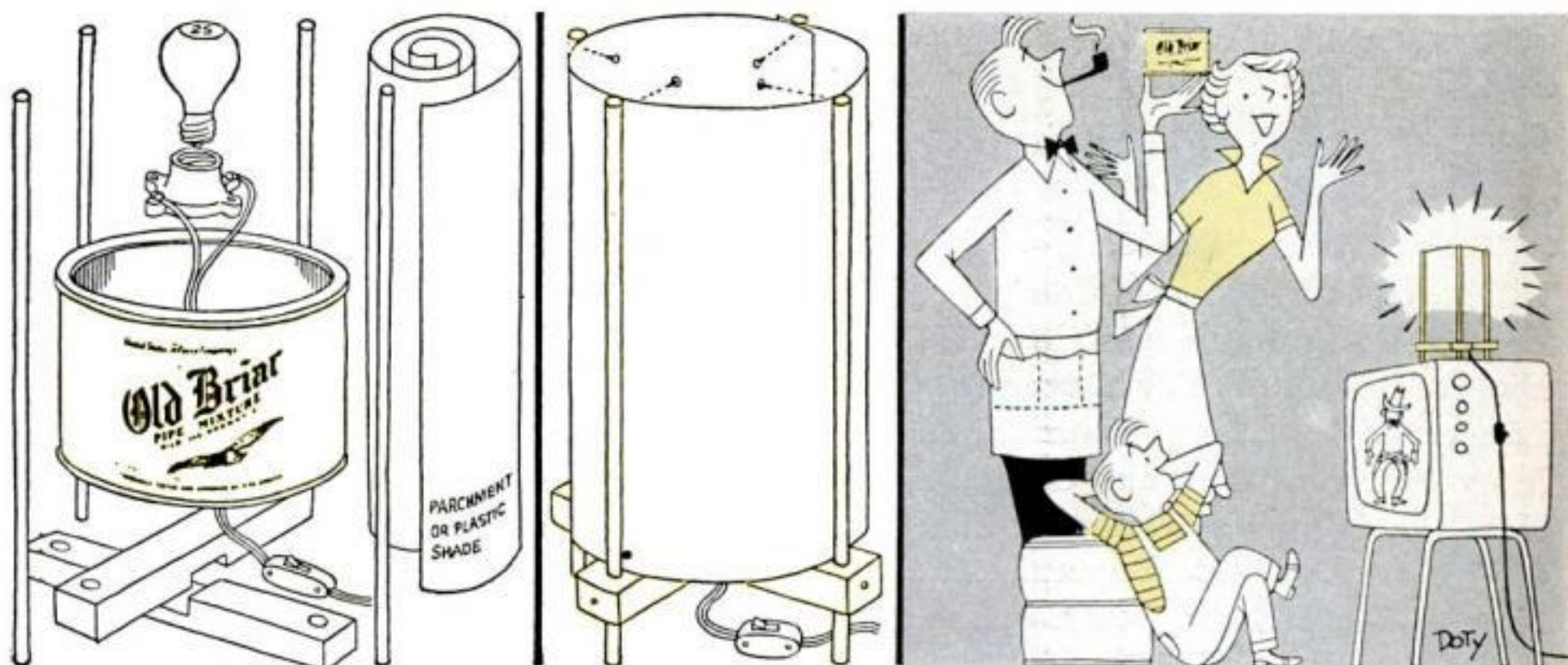
IT WAS YOU AND I.C.S. THAT MADE IT ALL POSSIBLE. WE THANK YOU BOTH!

I'VE SEEN IT HAPPEN OFTEN. I.C.S. NOT ONLY CAN CHANGE PEOPLE'S ADDRESSES, IT CAN CHANGE THEIR WHOLE WAY OF LIVING.

IF YOUR LETTER CARRIER IS LIKE ME, HE'LL BE GLAD TO TAKE A LETTER THAT HAS THE I.C.S. COUPON INSIDE. IT REALLY STARTS THINGS!



WIN A \$249 DE WALT POWER SHOP...109 OTHER PRIZES



Now! Enter Old Briar's "Pipe Schemes" Contest For October ... 110 Valuable Prizes!

First Prize \$249 DE WALT POWER SHOP! Does dozens of jobs easily.

3 Second Prizes 7 gallons STA-DRI ACRYLICOTE paint—for inside or outside use.

6 Third Prizes \$24.95 Rotary Blade NORELCO SPEEDSHAVERS.

100 Fourth Prizes Large can OLD BRIAR and a fine imported briar pipe.

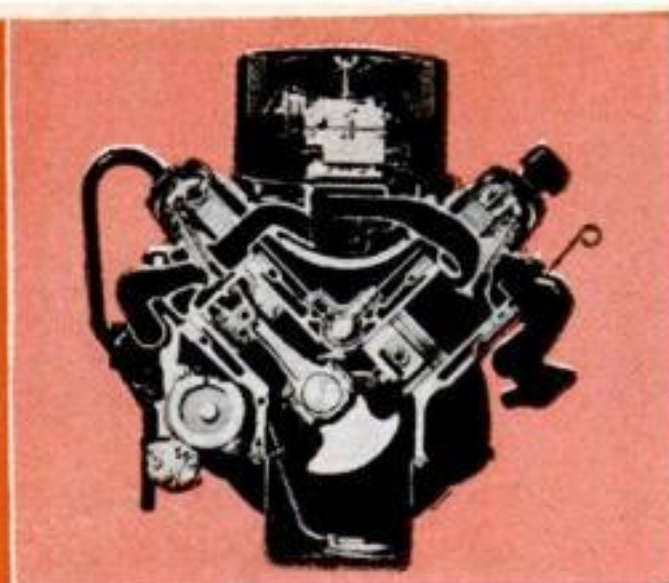


Old Briar mixture—rare flavor and aroma of Latakia, burleys and domestic favorites.

EASY TO WIN! Build a TV lamp with a pipe tobacco can as shown above. Be original—the example above is just *one* way of building it using a tobacco can. Photograph your TV lamp, mail photo and a statement of 25 words or less on why you like Old Briar, the friendly pipe tobacco to: **OLD BRIAR CONTEST**, Box 3226, New York 17, N. Y. Your entry must be postmarked October 31 or sooner! Contest to be judged by Popular Science.

(Contest subject to all Federal, State and local regulations. Employees, and immediate families of advertiser, their agency or Popular Science staff are not eligible to enter. All entries become property of U. S. Tobacco Co. for any and all purposes and cannot be returned. Winners will be notified by mail by December 31, 1960.)

OLD BRIAR IS ANOTHER FINE PRODUCT OF UNITED STATES TOBACCO COMPANY



Top hat: Air cleaner goes formal on little Olds. P. 72



Navigators: Do they really sight on the sun? P. 98



Blackout: Birdies singing? Medics call it "aura." P. 111

Founded in 1872 Vol. 177 No. 4

Mechanics and Handicraft REG. U. S. PAT. OFF.

Popular Science

October, 1960

Cover photo by W. W. Morris and Robert D. Borst

THE '61 CARS— SPECIAL AUTO SECTION

Buick, Olds, Pontiac Go Compact..	72
Ford and Plymouth Restyled.....	78
Picture Roundup: The Bigger Cars	80
Lancer, Falcon, and Valiant.....	82
More Powerful Lark and Comet....	83
How the Compacts Compare.....	84
6 Tips for New-Car Buyers.....	85
How to Test-Drive a New Car.....	88
850 Miles in a Buick Special.....	90
A Safety Expert Rates '61 Cars....	92
What's Coming in the Imports....	94

AUTO UPKEEP

Hints from the Model Garage.....	204
Gus Helps an Average Driver.....	210

SPECIAL FEATURES

How Birds Navigate.....	98
Tokyo to Carolina in 12½ Hours..	128
How Good Are Political Polls?.....	132
How a Voting Machine Works.....	136
3-in-1 Camera	138

SCIENCE AND INDUSTRY

When Will We Burn Water?.....	104
Storage Tanks on the Sea Floor....	108
When You Black Out.....	111

CONSUMER NEWS

Two-Way Radio Needs No License	120
What's New.....	122

PICTURE NEWS

Elevator Covers Swimming Pool..	115
Moving Day for an Oil Tank.....	126
Floating or Submersible Trucks....	140

Editor **HOWARD ALLAWAY**

Assistant Managing Editors

Kendall W. Goodwyn, Robert P. Stevenson

Senior Editors

Devon Francis, Martin Mann

Everett H. Ortner

Technical Editor

Hubert Luckett

Detroit Editor

Ken Fermoye

West Coast Editor

Wesley S. Griswold

Managing Editor **FRANK ROWSOME JR.**

Associate Editors

Alden P. Armagnac, Frank Dorr

Sheldon M. Gallagher, Herbert O. Johansen

Alfred W. Lees, Alex Markovich

Herbert R. Pfister, Joan Steen

Ruth Westphal

Editorial Assistants

Rosa Lee Beeland (Chief)

Anna Dallas, Bebe Lipson

Georgette Sparks, Dorothy Zallen

EDITORIAL OFFICES: 355 Lexington Ave., New York 17, N. Y.

Art Director **HOWARD C. JENSEN**

Art Editors

Herbert Anthony, Reginald A. Hawley

Harry Samuels

Art Associates

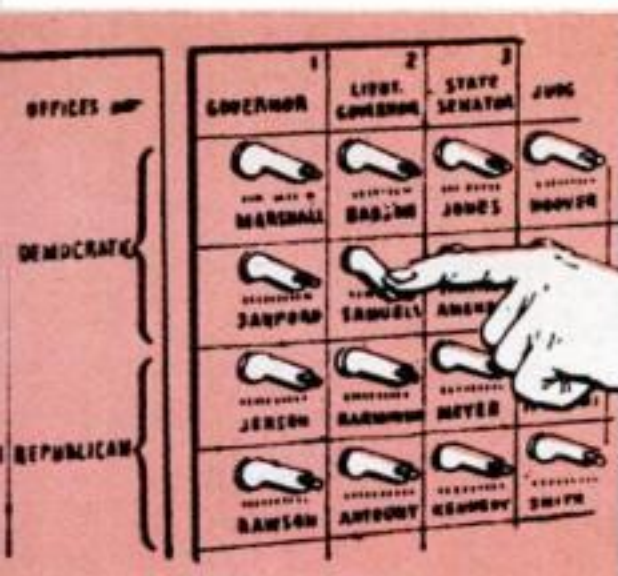
Eric A. Karminski Jr.

Henry W. Kazmirowski, Richard J. Meyer

Photography

W. W. Morris (Chief)

Robert D. Borst, Eugene Colangelo



Voting Machine: *How levers record your choice. P. 136*



TV: *Too many hula dancers? Look for a bad tube. P. 167*



Chimney flues: *Easy to clean—but wear old clothes. P. 150*

Monthly®

America's
NEW-IDEA MAGAZINE
for 88 Years

FOR HOME AND SHOP

Embarrassing Shop Moment.....	140
How to Winterize Your Home.....	141
Picture-Window Storm Sash....	142
Weatherstripping	144
Calking	147
Cleaning Chimney Flues.....	150
Extra Jobs for Wood Tape.....	154
One Machinist Tells Another.....	157
Boating Tips	160
Fixing Horizontal-Sweep Faults....	167
Build the Work-Horse Box.....	172
Storing a Tennis Table Overhead..	176
Photo Tips.....	178
The Goo with a Million Uses.....	180
Use Wheels to Save Your Back....	186
Cures for Ailing Shop Motors.....	189
Canvas Panels—Indoors or Out....	195
Plywood Table for a Router.....	200

SHORT CUTS AND TIPS

Improvised Nailing Gun.....	153
Radius Bar Guides Saber Saw.....	164
Retractable Film Racks.....	165
Dust Blower for Jigsaw.....	171
Unwarping a Saw Table.....	179
Starter Handle for an Engine.....	185
Sandbox to Last a Lifetime.....	194
Overhead Track for a Fan.....	199
A Home Typing Stand.....	218

EVERY MONTH

PS Readers Talk Back.....	4
The Month in Science.....	25
PS Puzzlers	28
Detroit Report	66
I'd Like to See Them Make.....	101
New Ideas from the Inventors.....	117
Wordless Workshop.....	162

Publisher EUGENE S. DUFFIELD

Advertising Manager LEE P. ADAMS

Circulation Director EUGENE WATSON

ADVERTISING OFFICES:

NEW YORK—355 Lexington Ave.
CHICAGO—360 North Michigan Ave.
DETROIT—2810 Book Bldg.
SAN FRANCISCO—114 Sansome St.
CLEVELAND—636 B. F. Keith Bldg.
LOS ANGELES—711 South Vermont
PORTLAND, ORE.—520 S.W. Sixth Ave.

SUBSCRIPTION SERVICE:

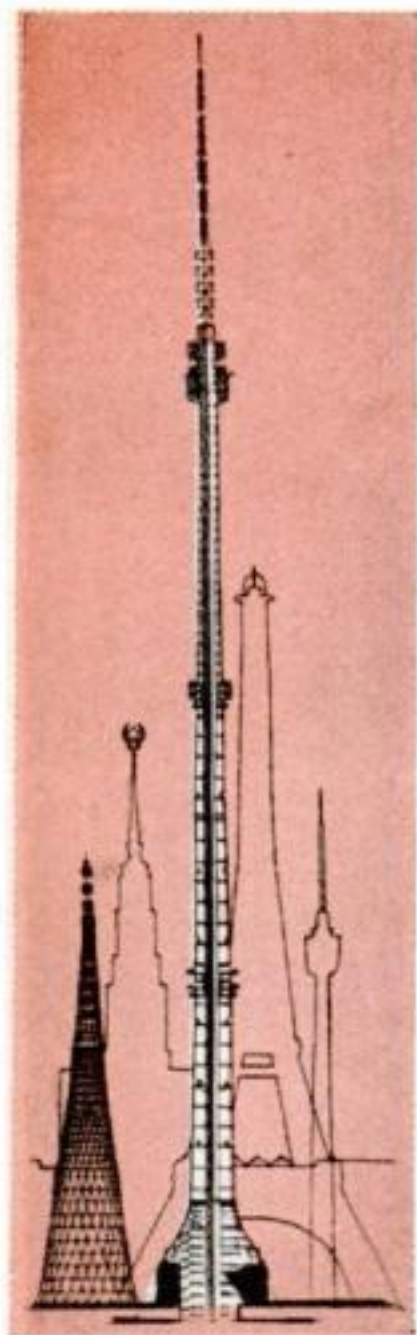
Address all subscriptions and correspondence concerning them to: Popular Science

Subscription Department, 355 Lexington Ave., New York 17, N. Y. Allow four weeks' notice for change of address. Please give both old and new addresses, including zone numbers. Published monthly at 355 Lexington Ave., New York 17, N.Y., by Popular Science Publishing Co., Inc., Godfrey Hammond, Chairman of the Board; Eugene S. Duffield, President; Franklin E. Parker Jr., Secretary; Eugene Watson, Vice-President; Robert D. Beals, Treasurer and Business Manager. Second-class postage paid at New York, N. Y.,

and at additional mailing offices. Entered as second class matter at the Post Office Department, Canada. Printed in U.S.A. Copyright © 1960 by Popular Science Publishing Co., Inc. All rights reserved. Single copy 35¢. Subscriptions to United States, its possessions, and Canada, 1 year \$3.40 (2 years \$6.00, 3 years \$8.00). Elsewhere, 1 year \$6.00 (2 years \$11.00, 3 years \$16.00). Send notice of undelivered copies on Form 3579 to Popular Science Monthly, 355 Lexington Avenue, New York 17, N. Y.

PS Readers

TALK BACK



Russians Reach High

You were right when you said that Maine's distinction as the home of the world's tallest structure [Aug.] wouldn't last long. The championship is going to Moscow, where construction has begun on a fantastic building. The Russians say that it will reach 1,666 feet, 47 feet higher than Maine's huge TV tower and 194 feet beyond the Empire State Building's height. Its antenna mast (serving three TV stations and three FM radio stations) will top a

gigantic inverted ice-cream cone of reinforced concrete. Inside the base there will be studios and offices and, at the 1,180-foot level, a three-story restaurant and observation platforms for tourists.

THEODORE M. HANNAH,
Silver Spring, Md.

Case of the Wrong Initial

MY SON and I were delighted to see the photographs of us ["PS Readers Talk Back," July] and the Wankel engine we built. Since then there has been considerable interest in the engine and we have demonstrated it running quite frequently.

Unfortunately, the middle initial of my name was incorrectly given, causing some confusion—there are some 50 Thomases in the city telephone directory. W. T. THOMAS SR., Daytona Beach, Fla.

Unmarked Cars: Good or Bad?

CONGRATULATIONS on "Unmarked Police Cars: Good or Bad?" [July]. At the

last session of the Minnesota Legislature, such cars were banned, as the law directs that all police cars shall be marked in the same manner and allows only the continued use of present unmarked cars, but not replacements.

I am very much opposed to our present law as I feel unmarked cars have a real value in traffic-law enforcement. I am making every effort to have the law repealed at the next session of our legislature.

BOB B. EBBESEN, County Atty.
Redwood Falls, Minn.

... To my knowledge, Oregon State Police use no unmarked cars, but Portland city police do. These cars are so patently unmarked that they stand out in traffic nearly as vividly as marked cars.

Three I have in mind are '57 Fords—all of the cheapest model, with blackwall tires and a minimum of chrome trim. They're all one solid color, too, with a small aerial on top of the roof as a conspicuous finger. The city's cars, in effect,



are marked by their very plainness. They can be spotted just as easily as a police car with all the trimmings.

BARNEY R. KLIKE, Portland, Ore.

... LET'S set up a hypothetical case: A jewelry salesman carrying samples worth \$30,000 is driving after dark and traveling a bit over the speed limit. Suddenly an unmarked car overtakes him and the driver, who can be seen only dimly, motions him off the road. The salesman takes off fast and the unrecognized policeman fires a warning shot. The salesman, sure he has met a robber, fires his gun to show he is armed. The policeman, now sure he is chasing a criminal,

CONTINUED

Corvette wins
with
Autolite Spark Plugs
in 1960
Pikes Peak
Hill Climb



SPORTS CARS, STOCK CARS, ALL MAKES OF CARS ARE WINNING WITH AUTOLITE!

From coast to coast, the performance of Autolite Spark Plugs means victory! *At Pikes Peak, Colorado*—Autolite-sparked Corvette—as well as 2 Autolite-sparked Porsches—sweep all three sports car classes in the 1960 race to the top. *At Ascot Speedway, Calif.*—50 lap, Late Model Stock: 9 out of 10 first finishers—including

a Dodge, Mercury, Plymouth and Ford—all Autolite equipped. *At O'Hare Speedway, Ill.*—Autolite-equipped Chevrolet takes first place in 25-lap, Late Model Stock.

The point: whatever car you drive—wherever you drive it—you're always right with Autolite!

AUTOLITE® SPARK PLUGS

PERFORMANCE PROVED IN COMPETITION FOR ALL CARS



COMMERCIAL SOD GROWER: Louis DeLea, East Northport, Long Island, N.Y. "With Super Mileage Lugs we get the traction we simply must have in the sod field, yet they're giving us real good wear out on the highway."

FLOTATION TIRES EASE 16-TON LOADS OF SOD OUT OF SOFT FIELDS

Firestone

proved where profit depends on performance

It takes flotation and traction to pull giant 16-ton loads out of soft, slippery fields. Long Island's largest commercial sod grower does it daily—with Firestone tires which he uses exclusively on all his trucks. On the highway, too, Firestones deliver top performance at a low, low cost per mile. In fact, they run 425-million grueling test miles annually to prove the strength of Firestone Shock-Fortified cord and Firestone Rubber-X, longest-wearing rubber ever used in Firestone truck tires. It's true: where profit depends on performance, truckers depend on Firestone tires. Get them at your Firestone Dealer or Store.

Copyright 1960, The Firestone Tire & Rubber Company



Transport*

Super Mileage Lug*

Super All Traction*

Rib Excavator*

Rock Grip Excavator*

All Traction*

*Firestone T.M.

*Here's owner proof of
Firestone truck tire
performance!*



LUMBER PRODUCTS HAULER: Maury Goodloe, Chicago, Illinois. "Running 2,000 miles a week over Route # 66 can be murder on tires. That's why we've switched to Firestones. They can really take the torture."



PRODUCE HAULER: John Romkema, Grand Rapids, Michigan. "Getting fresh produce to market on time demands a tight schedule. I can't afford any delays with tire trouble. That's why I'm 100 per cent on Firestones."



GRAVEL HAULER: Grove Lawson, Des Moines, Iowa. "I've never had a Firestone blow-out in all the years I've used them on my truck. I would recommend Firestones to anyone on the basis of the performance they've given me."

fires his gun for real. You take it from there. Was the unmarked police car worth it?

W. A. WILSON, Akron.

Putting in Plugs the Hard Way

THE gapless plugs ["The Truth About Spark Plugs," June] would be worth buying if only one of the features claimed were true: freedom from adjustments. To check and adjust the plugs on my '60 Chrysler New Yorker, the following procedure is necessary:

Jack up the car to two different levels (to reach front and rear plugs), use two different-length socket extensions to get at same, and—unless the manifold and exhaust pipes were given a couple of hours to cool off—don elbow-length asbestos gloves. How ridiculous is it possible to get?

H. L. HAGENBUCH, Bloomsburg, Pa.

... As YOU say, some plugs lose their efficiency as they become warmer. Why not solve this problem by using a bi-metallic outside electrode, working like a thermostat?

In the drawing, B would be the gap when running cold. This gap would steadily increase as temperature rises, finally reaching a maximum distance, A, which would be the most efficient at high speeds. As speed and temperature decrease, the gap would decrease proportionately. The ratio of expansion and contraction would have to be found by trial and error.

MICHAEL KOVALIK, Steubenville, Ohio.

Prisoners on Ice

PARKING prisoners of war under an ice-cap, as one June letter suggested, may sound far fetched, but the storage of surplus food there is certainly feasible.

LEONARD STEIN, Chicago.

Our Puzzlers Report

DIDN'T you goof on the puzzle about a monkey climbing a rope suspended over a pulley [June]? You say both the monkey and the weight on the opposite end of the rope would rise. Haven't you forgotten the weight of the rope? As the monkey climbs, he pulls more of the rope

to his side. If he moves slowly enough, the weight could be going up and the monkey going down (in relation to the pulley) even though he was still climbing the rope.

ROBERT BATEN, Lake Charles, La.

... I'D SAY your answer to the climbing monkey puzzle is incorrect.

Once, while working on a high scaffold and not wishing to climb down for lunch, I had the tender hook my lunch box to a pulley rope and send it up. All went fine until the weight of the rope overbalanced the weight of the box. Up it came like a shot, finally striking the pulley and almost going into orbit. There I stood, amid a cloud of sandwiches and grapes.

R. T. HUBBARD, Spokane.

In Puzzledom, all simple frictionless pulley systems are weightless, a point that perhaps should have been mentioned.

... Have you run across this enigma, once popular among Latin students? *Fratres et sorores nunquam habeo; sed pater illi viris est filius mei patris. Qui dicit?* (Brothers and sisters I have none; but that man's father is my father's son. Who is speaking?)

Of course the "son" mentioned is the speaker and "that man" is his son or the grandson of "my father."

J. C. HIERHOLZER, Umatilla, Fla.

... IN JUNE, the Puzzle-of-the-Month required that we find the shortest route for a spider on the wall to get to a fly across the room. You said speed was important, so I say you should have had two answers in July: 1) 40 feet—the one you gave as shortest: 2) the fastest—the



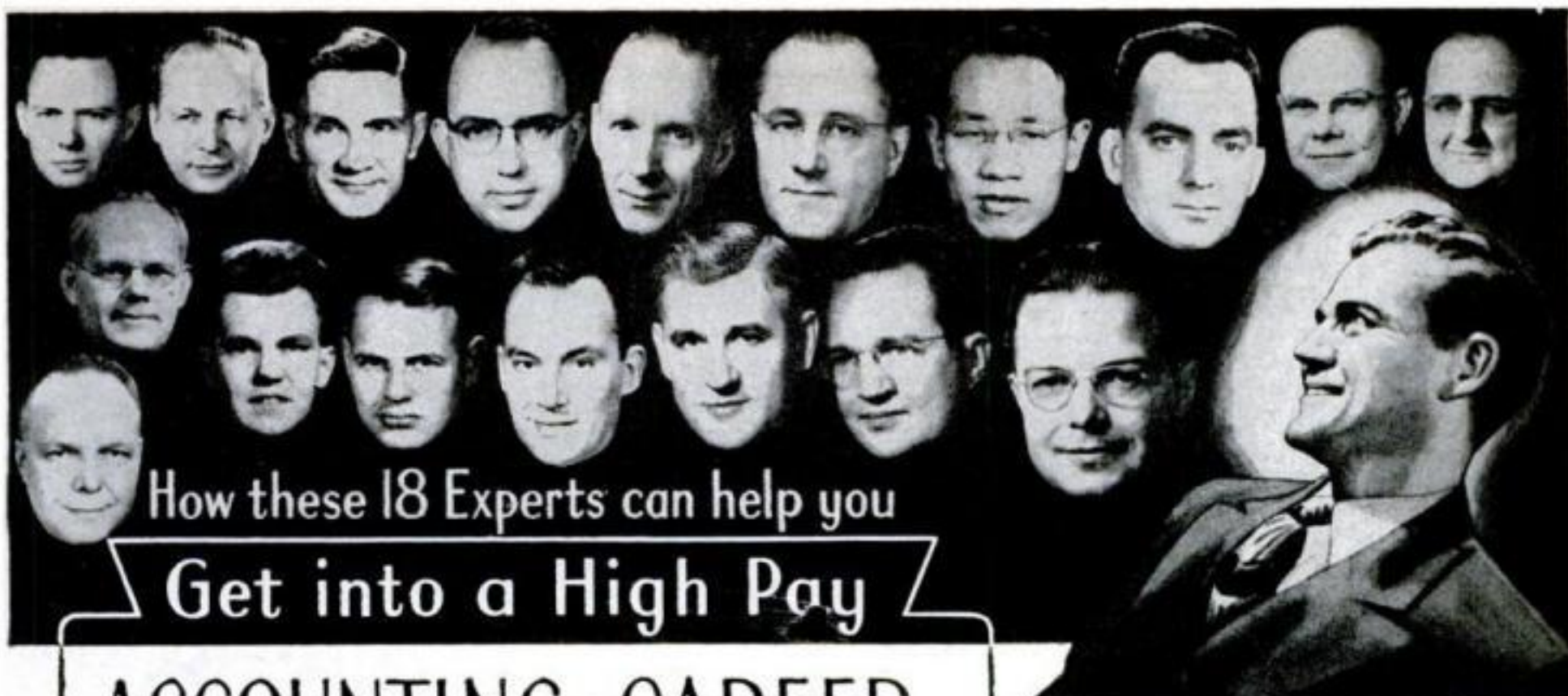
spider drops 11 feet to the floor and then runs the last 31 feet.

DAVID J. SCHAUB, Alma, Wis.

So Good It Can't Die

THE bike spring that stores power ["New Ideas from the Inventors," June] is an idea old enough to be collecting Social Security.

In our files here I find an 1895 *Scientific American* article stating: "Device is



How these 18 Experts can help you

Get into a High Pay

ACCOUNTING CAREER

If your heart is set on a larger income and all that it means... better home—fine car—larger bank account—more of the good things of life....

If that's your ambition and you are really serious about it, then you owe it to yourself to get the REAL FACTS about LaSalle Accounting, and the many good-pay opportunities that can be YOURS through LaSalle's famous Problem Method plan.

It matters not whether you've had a single day of experience in this field—or whether you have already started but want to climb higher. LaSalle's expert training is designed to take you from where you are... to where you want to be... in higher positions and a lifetime career of security and good income.

WHY YOU CAN'T FAIL TO GAIN

You see on this page a panel of experts who know Accounting from A to Z...all the way from Basic Accounting on up through Accounting Systems, Cost Accounting, Auditing, Federal Income Tax, and training for the CPA certificate. These are only part of our instruction staff. But what is most important to you... These CPAs and Expert Accountants know how to impart their knowledge to others... how to help you prepare quickly yet thoroly for success in this lucrative field.

The proof? What stronger proof could there

be than that more than 4,500 Certified Public Accountants (one out of every 13 of the U.S. total) has trained with LaSalle? Or the hundreds of thousands of men and women whom LaSalle has helped qualify rapidly for more money, a brighter future, in a high-pay-lifetime career? These thousands came to us with different backgrounds of experience and varying degrees of ambition. Many have reported raises and promotions after only a few weeks of training. Thousands of them have written to say they are now earning 50% more—even *double* their former incomes—often in less than a year. These letters are published in book form for your inspection. They were written by real people, with real income problems and ambitions—people who might be your next-door neighbor.

Yes, if you are really sincere in wanting to better your position—start your income climbing—enjoy a lifetime career of high standing and high reward—this friendly staff of experts can help you.

LaSalle's famous staff of Accounting authorities are helping thousands prepare for fast promotions and bigger pay. They can do the same for you!

SAMPLE LESSON SENT FREE MAIL COUPON BELOW

You don't have to wonder what LaSalle's Accounting plan is like. You will be sent a free sample lesson, which does not obligate you in any way. Study it—keep it—see for yourself how simple, clear, and easy it is to master. This is an actual lesson right out of the regular training—to show you exactly how LaSalle's Problem Method has trained more than 1,400,000 men and women from all walks of life.

Also...the latest book, "Opportunities in Accounting," gives all the latest facts about the new and growing opportunities in several different fields of profitable employment.

This can be an important day in your life. A coupon like the one below has started hundreds of thousands of men and women toward a bigger job, a larger income. It can do the same for you.

Accredited Member, National Home Study Council

Mail the Coupon Today!

FREE BOOKS

LA SALLE EXTENSION UNIVERSITY

A Correspondence Institution

417 S. Dearborn Street Dept. 1083H Chicago 5, Ill.

Send me free Sample Lesson in Accounting—also, latest free book, "Opportunities in Accounting," and "Success Reports"...all without cost or obligation.

Name..... Age.....

Address.....

City & Zone..... State.....



so arranged that, when riding downhill, or even on the level, the rider can at will throw a spring into gear and by degrees wind it up to its limit. Then, when a hill is to be climbed, he can turn on the power and let the spring give back some of the energy stored in it."

The fellow who invented it lived in a house less than a mile from his lab but 80 feet higher on the mountain. He wound up the spring on the way down to save a heavy pull on the way home. His name was Thomas A. Edison.

WM. R. TUTHILL, Director
Museum of Speed, Daytona Beach.

Bikes Are for Everybody

I REALLY enjoyed "Who Says Bikes Are for Kids?" [June]. This snapshot,



taken two years ago, shows how bikes are parked in the streets in Sweden. At depots, when people take a train to the city for a shopping trip or a week's vacation, they hang their bikes on a large hook under the roof of a shed (provided by the railroad). The bikes will be there on their return. Bike locks in Sweden are most unusual.

MRS. A. H. SEABERG, Lucerne, Calif.

... THE ode to the bicycle by Evan Wylie took my thoughts back more than 65 years to when I was a boy living on Washington Heights in New York. We all had bikes and made many trips to Coney Island via the bicycle freeway in Brooklyn to the beach. In those days there was a hotel there shaped like an elephant. And cable cars clanked over the Brooklyn Bridge as we pedaled along.

T. U. ANGELL, Santa Rosa, Calif.

Here's the Pitch

IN "Which Roofing Should You Buy?" [June] you refer to the pitch of a roof as the same as the rise in relation to the horizontal run. I have always understood that the pitch is the ratio between the rise and the span (width of the build-

ing). Therefore a roof with a rise of 4 feet in a 12-foot run (half the span) would have a $1/6$ ($4/24$) pitch. The rise would be $4/12$ or $1/3$.

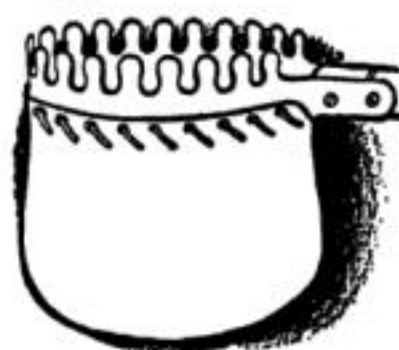
J. E. CROWE, Calgary, Alta.

Not so. The pitch is the slope of the sides expressed by the ratio of the height to the span. The "rise and run" is the ratio of the height to the half span.

Crowning Touch

THAT long-reach fruit picker ["Short Cuts and Tips," July] doesn't look as good to me as one I have. It plucks the fruit and drops it in the sack every time—cherries as well as apples.

It's just a crown cut from sheet metal and screwed to a long bamboo pole. Six inches high and six inches in diameter, it is punched with holes at the bottom so the cloth bag can be stitched to it. The trough of each loop at the top of the crown is strengthened slightly.



MRS. JACK ^{no} R, Mansfield, Ohio.

Another Gus Wilson?

A FRIEND of mine, who runs his own Gus-Wilson-type garage, told me an interesting story on how he's been setting the camber on certain makes and models of cars, with good results.

He just sprinkles sand on the floor and rolls the car back and forth through it. Then he studies the grains of sand adhering across the tire, and adjusts until the sand sticking to the tire is evenly spread all the way across the tread.

"I've got a gauge made for setting camber," says he, "but I don't use it except to impress customers. Even then, actually I still go by the grains of sand sticking to the tire."

R. A. BROWN, Shelbyville, Tenn.

Aerobatics

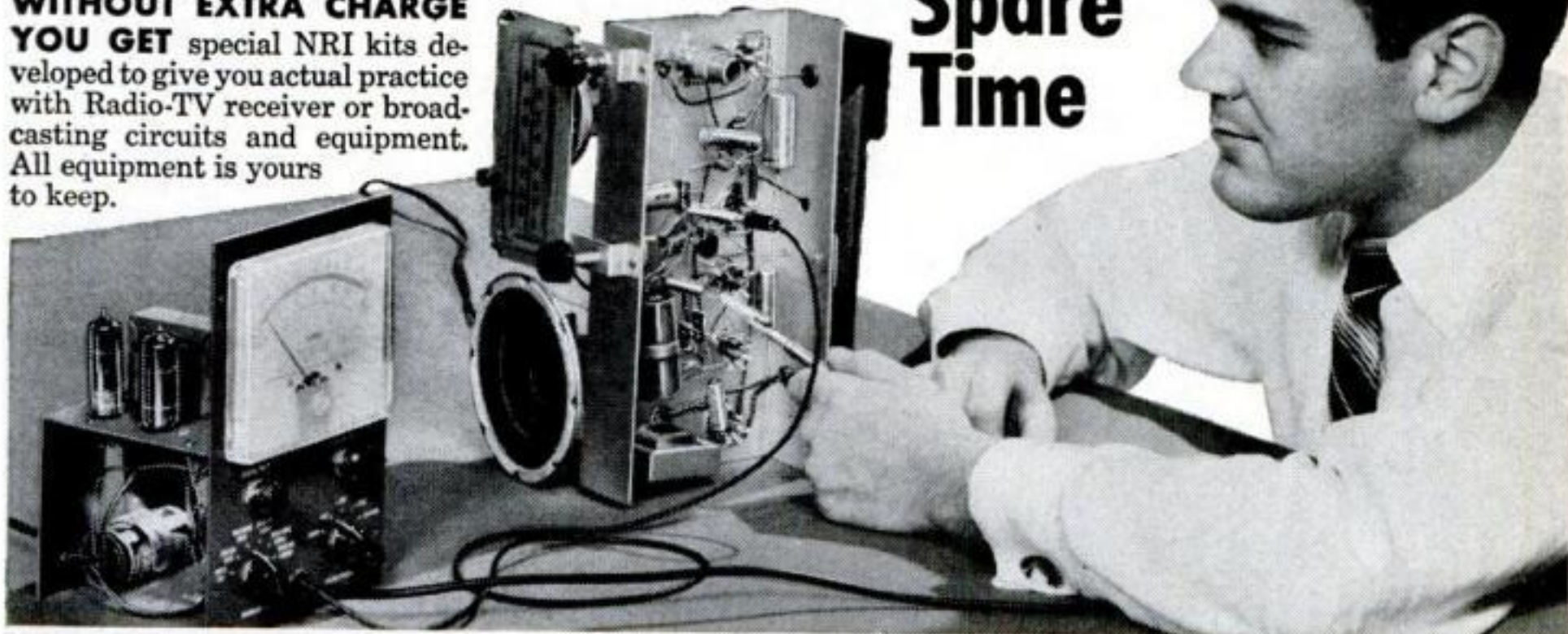
RECENTLY, about dusk and just after a heavy rain, I noticed four or five bats flying around outdoors. Having read your article on bats last May, I remembered your question: "Can they tell size, shape ... color?"

To experiment a little, I tossed up a small stone (the size of a pea) at a fast clip. All the bats veered up violently

Learn Radio-Television Electronics

by Practicing at Home in Your
Spare Time

**WITHOUT EXTRA CHARGE
YOU GET** special NRI kits developed to give you actual practice with Radio-TV receiver or broadcasting circuits and equipment. All equipment is yours to keep.



Fast Growing Field Offers You Good Pay, Success, Bright Future



J. E. SMITH
Founder

Bigger than ever and still growing fast. That's why Radio-TV has special appeal to ambitious men not satisfied with their job and earnings. More than 4,000 Radio and TV stations. More than 150 million home and auto Radios, 40 million TV sets. Color TV promises added opportunities. For the trained man, there are good jobs, bright futures in Radio-TV Servicing or Broadcasting.

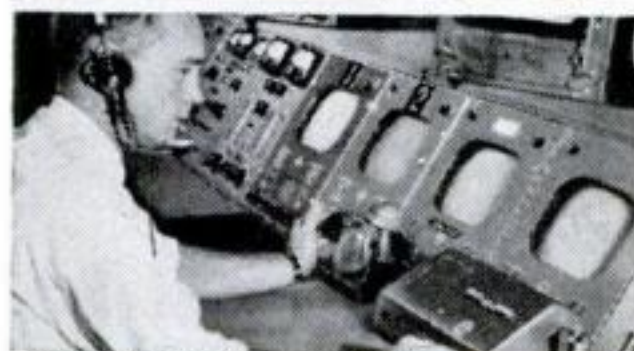
Training PLUS opportunity is the ideal combination for success. So plan now to get into Radio-TV. The technical man is looked up to. He does important work, gets good pay for it. Radio-Television offers that kind of work. NRI can supply training quickly, without expense of going away to school. Keep your job while training. You learn at home in your spare time. NRI is the **OLDEST** and **LARGEST** home study Radio-TV school. Its methods have proved successful for more than 40 years.

Added Income Soon - \$10, \$15 a Week in Spare Time

Soon after enrolling, many NRI students start to earn \$10, \$15 a week in spare time fixing sets. Some pay for their training and enjoy extra luxuries this way. Some make enough to start their own Radio-TV shops. NRI training is *practical*—gets quick results. Easy to understand, well illustrated lessons teach you basic principles. And you **LEARN-BY-DOING** by practicing with kits of equipment which "bring to life" things you study.

Find Out What NRI Offers

NRI has trained thousands for successful careers in Radio-TV. Study fast or slow—as you like. Diploma when you graduate. Mail coupon now. Paste it on a postcard or mail in envelope. **ACTUAL LESSON FREE.** Also 64 page catalog that shows opportunities, shows equipment you get. Cost of NRI courses low. Easy terms. **NATIONAL RADIO INSTITUTE,** Dept. OKB, Washington 16, D. C.



RADIO-TV BROADCASTING (see above) offers important positions as Operators and Technicians. **RADIO-TV SERVICING** Technicians (see below) needed in every community. Their services are respected, their skill appreciated.



N.R.I. TRAINED THESE MEN FOR SUCCESS



"I was repairing Radios by 10th lesson. Now I'm Engineer for WHPE." **M. R. LINDEMUTH,** Fort Wayne, Ind.



"Doing spare time repairs on Radio and TV. Soon servicing full time." **CLYDE HIGGINS,** Waltham, Mass.

"I had a successful Radio repair shop. Now I'm Engineer for WHPE." **V.W. WORKMAN,** High Point, N.C.



"There are a number of NRI graduates here. I can thank NRI for this job." **JACK WAGNER,** Lexington, N. C.



VETERANS Approved Under G.I. Bills

SEND FOR BOTH FREE

National Radio Institute

Dept. OKB Washington 16, D. C.

Mail me Sample Lesson and 64-Page Catalog FREE. (No salesman will call. Please write plainly.)

Name _____ Age _____

Address _____

City _____ Zone _____ State _____

Accredited Member National Home Study Council



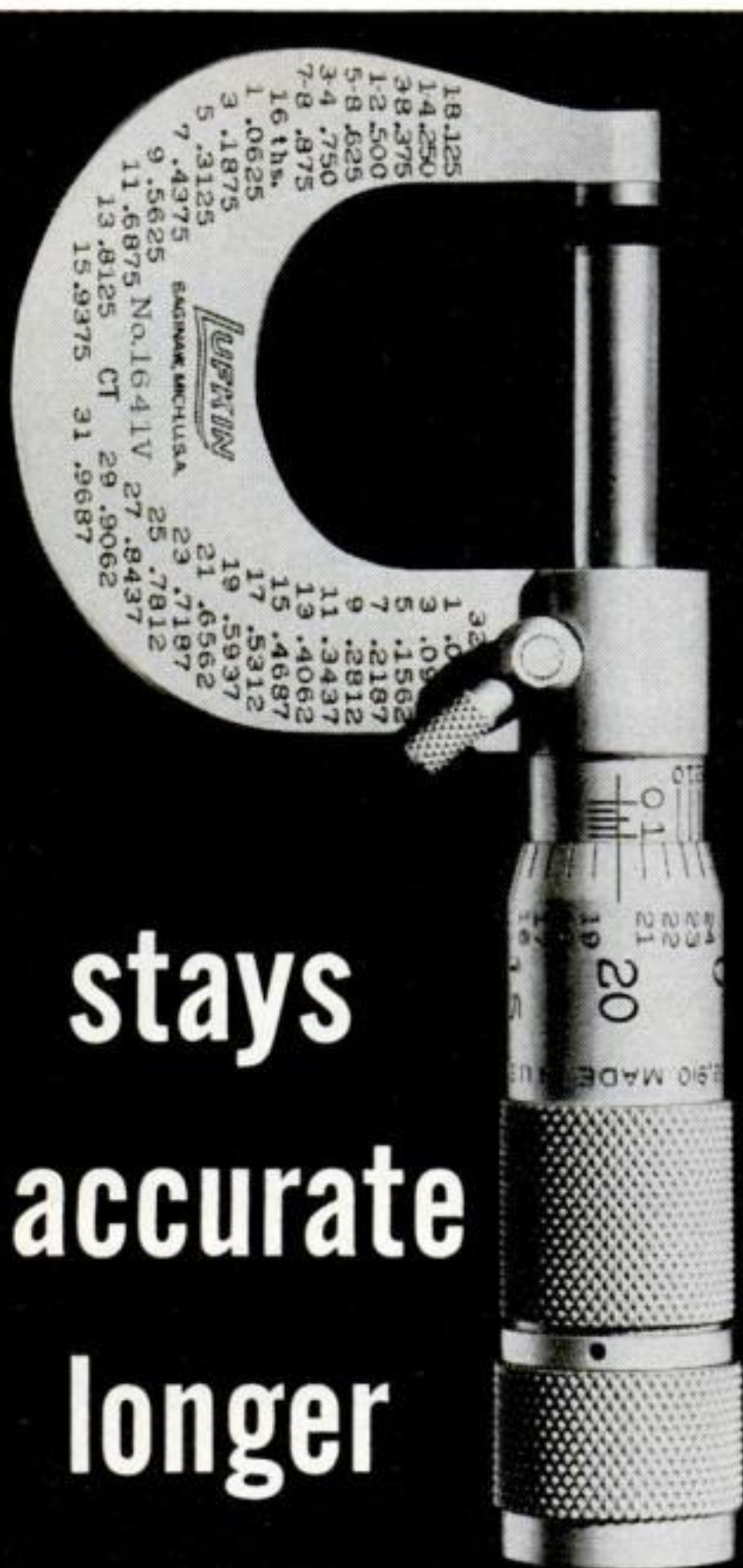
stays
accurate
longer

A LUFKIN EXCLUSIVE: 5 to 7 fewer parts than other micrometers . . . less to get out of adjustment! One-piece frame and hub simplifies wear adjustment, assures greater accuracy. Exclusive cam lock prevents reading errors. Ratchet stop top. Easy-to-read markings on nonglare *Chrome Clad®* finish.

Leading Industrial Distributors feature Lufkin — the new leader in precision tools.



LUFKIN
SAGINAW, MICHIGAN



after it and went into a steep dive, barely missing the street. I tried a larger, irregularly shaped stone and they dove after it. Then I tossed up a shell 1/2-inch in diameter. This went off to the side, but a bat immediately dove upon it.

W. H. HANSEN, Lake Worth, Fla.

The Machine That Walks Like a Man

IN THE sketches showing how a dragline walks ["Tanks That Walk and Jump," July], the circular base plate is shown being lifted clear off the ground. The one I am familiar with (Marion) just lifts up the leading edge of the base plate and drags it on its trailing edge. Don't they all?

H. E. NOLD, Winslow, Ind.

. . . THE rotating cam of that walking dragline is moving in the wrong direction. The way the cam is rotating in your illustration, the machine would move forward instead of backwards.

K. HILL JR., New Philadelphia, Ohio.

The artist drew the cam action backwards. The cam should rotate clockwise.

The Shrinking Yen

RUN it in "I'd Like to See Them Make"—and you did last April—and in a few months' time it's on the market! Seems like they're now making washable



paper money in Japan—the 10,000 yen (\$25) denomination. The new paper is said to resist the effects of water 25 times better. But the money has a tendency to shrink a little after being soaked in water.

H. I. DIAZ PUMARA,
Pine Grove Mills, Pa.

A Car That Never Saw a Showroom

THE car you show on page 77 in June ["Torture-Testing Cars for Police Patrol"] has a Dart front end with a regular Dodge rear end. How come?

EARL OBERMOELLER, St. Louis, Mo.

The hybrid is a special Police Model. The inexpensive Dart front sheet metal

"NOW EARN 5 per annum $\frac{1}{2}$ % paid quarterly

on your savings account...by mail! it's safe and more profitable"

SAYS A. G. NEUMEYER,
*President,
First Western Savings*



First Western Savings, Nevada's largest, and Southern Nevada's oldest savings association, operating under the savings and loan laws of the State of Nevada, is able to offer higher than average interest rates because we are located in the fastest growing area in the nation, where dollars are needed to finance our remarkable growth. We pay more for this money and in turn, because of our dynamic growth economy, earn more money on our lending program than would be possible in a slower growing area. Specifically, on December 6, 1959, the United States Census Bureau revealed that our area is growing at 4.1 times the Los Angeles rate, and 10.6 times the national rate!

The current interest paid to First Western savers is: $5\frac{1}{2}$ % per year on accounts of \$5,000 or more, and $5\frac{1}{4}$ % per year on all others.

We have paid substantially higher rates year in and year out to our more than 18,000 prudent savers from all fifty states and fifty-one foreign countries. In fact, this new rate follows 17 consecutive interest payments to First Western savers of 5 % per year or more!

Saving by mail at First Western, is easy, and most profitable. We are no further away than your mail box. To open an account send check or money order. To transfer an account from your present financial institution, just send your passbook or certificate to us. We'll attend to all the details.

Remember: at First Western interest is paid quarterly on all accounts. Withdrawals have always been paid instantly. Airmail postage is prepaid both ways. Funds received by the 15th of any month earn from the 1st. \$1.00 opens an account.

Mail funds to:

FIRST WESTERN SAVINGS

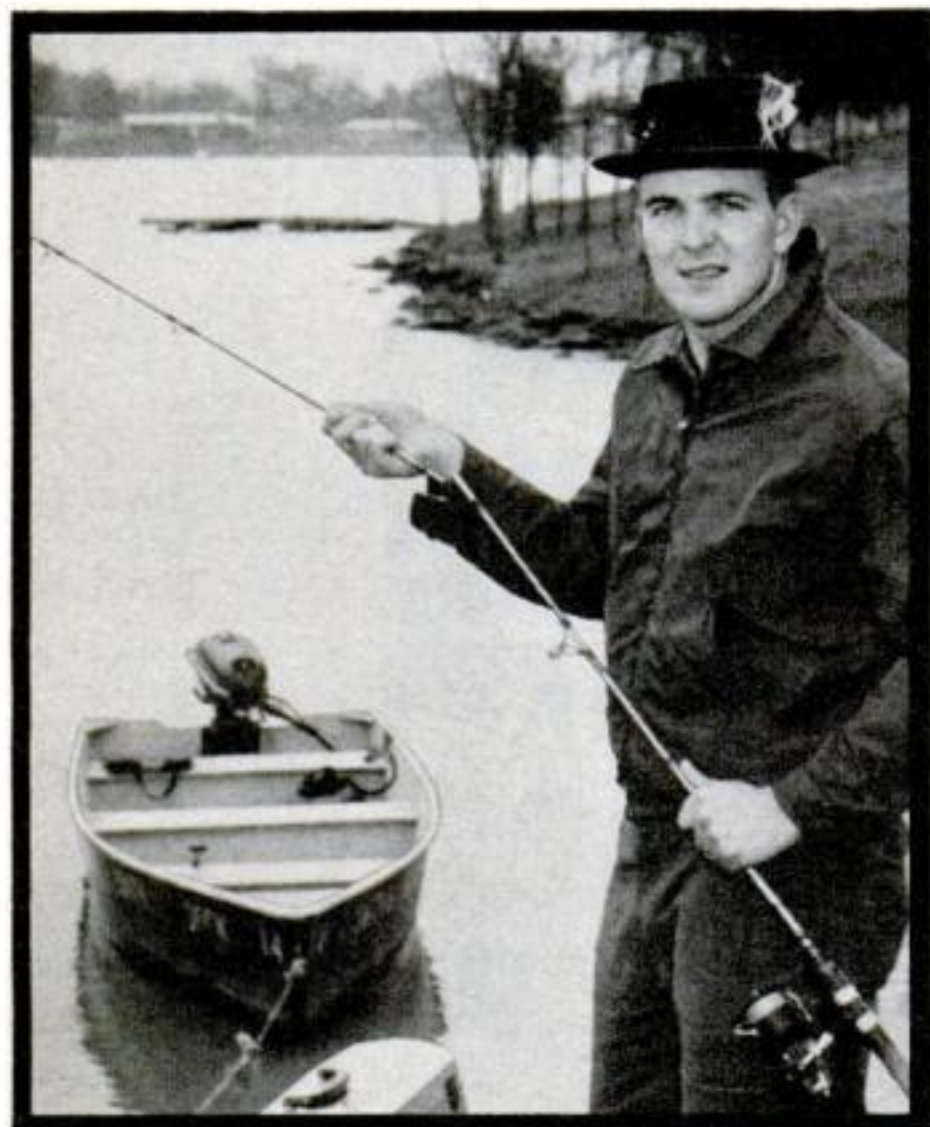
AND LOAN ASSOCIATION, DEPT. G

118 Las Vegas Blvd., South, Las Vegas, Nevada • A. G. Neumeyer, Pres.

RESOURCES OVER \$36,000,000.00



ALL-AMERICAN HALFBACK DISCOVERS OIL!



Tom Moore, ex-all-American, now of the Green Bay Packers, has discovered the richest, most complete motor oil in the world—Pennzoil Z-7!

"I drive 25,000 long, hard miles every year," says Tom. "A lot of it in hard-on-engines, stop-and-go city traffic. A tough workout for any car. But with Pennzoil Z-7, my car goes whenever I need it—and keeps going!"

This amazing oil is so rich it gives double the protection demanded. So complete you never need extra additives. Refined from 100% pure Pennsylvania crude, Pennzoil contains special power ingredient Z-7 that keeps engine parts so clean the oil can give peak lubrication protection *full time*.

Ask for Pennzoil by *name*—at your favorite car dealer, service station or garage. Sound the "Z" that makes Penn Oil—PennZoil.

Member Penn. Grade Crude Oil Assn.
Permit No. 2, Oil City, Pa.



is used to reduce cost of the car; the long Dodge body is used to meet specifications of highway patrols and police departments.

Special for Dinghy Builders

ABOUT that "20-Buck Dinghy for the Kids" [July]: You say, "Side edges on both pieces must be beveled—five degrees on the bow piece, 15 degrees on the transom piece." Shouldn't this be just the opposite?

CHARLES KARIAN, Webster, N. Y.

Right. The bevel should be steeper at the bow—the narrow part of the boat. The transom, which is nearly as wide as the beam, would have only a slight bevel.

Fastest Is Still the Fastest

THE Flying Caduceus ["Jet Car Aims at 500-M.P.H. Record," July] will never make it. The use of pure jet engines, delivering power by thrust, is ruled out by the International Automobile Federation, which requires that power be transmitted to at least one pair of wheels. Thus, Dr. Nathan Ostich can never set an official land-speed record.

WILLIAM JENNINGS, Toronto, Ont.

Woodman, Don't Nail That Tree

THE "Camping Hints from Here and There" [July] were good ones, but one thing distressed me. Two hints show items nailed to trees. Pounding nails into trees is harmful to them and against



Forest Service regulations. Anyway, isn't it easier to throw a rope around a tree limb than to climb a tree and drive in a nail?

RICHARD WHITE, Berkeley, Calif.

Interminable Terminology

IN THE July letters, C. F. Lehman, NAS, gets a bit sticky about converters vs. inverters. We sure get arguments

CONTINUED



In Spare Time at Home—Prepare for a Better Job—or
Your Own Business in One of the Many Branches of

ELECTRONICS

You build and keep this valuable Vacuum Tube VOLT-METER



You build and keep this 5-inch COLOR OSCILLOSCOPE—almost a "must" for TV servicing.



HOME MOVIES . . .

. . . make important points crystal clear. Speeds your learning. It's almost like having an instructor at your side!

MILITARY SERVICE

If you are subject to military service, the information we have should prove very helpful. Mail coupon to-day.

21 INCH

Build and keep this BIG DeVry Engineered TV set—easily converted to U.H.F. (DeVry offers another home training, but without the TV set.)

RADIO - TELEVISION - RADAR

If you are seeking a better job or a business of your own, the appealing field of Television-Radio-Electronics offers REAL PROMISE!

In this fast-growing field, trained Electronic technicians find many good-paying, interesting jobs in manufacturing, installing, operating, servicing. Equally important is the fact that these are GOOD JOBS—offering the kind of a future that an untrained man often dreams about.

No previous technical experience or advanced education needed. Prepare for this profitable field in your spare time at home, or in our modern Chicago or Toronto Laboratories. Nothing else like it! Send for FREE details.

EARN WHILE YOU LEARN

After you get part of DeVry Tech's training with equipment at home, you may then in your spare time, begin to earn real money servicing Radio and Television sets.

COLOR TV

DeVry Tech's program also includes training in Color Television

Your GUIDE

to Profitable Job Opportunities

TV-Radio Broadcast Technician
Color Television Specialist
Radar Operator • Laboratory Technician
Airline Radio Man • Computer Specialist
Quality Control Manager
Your Own Sales & Service Shop
. . . PLUS MANY OTHERS

YOU GET THE SAME

EMPLOYMENT SERVICE

that has helped thousands of our graduates toward fine careers in Electronics.



Send for FREE BOOKLET TODAY! ▶

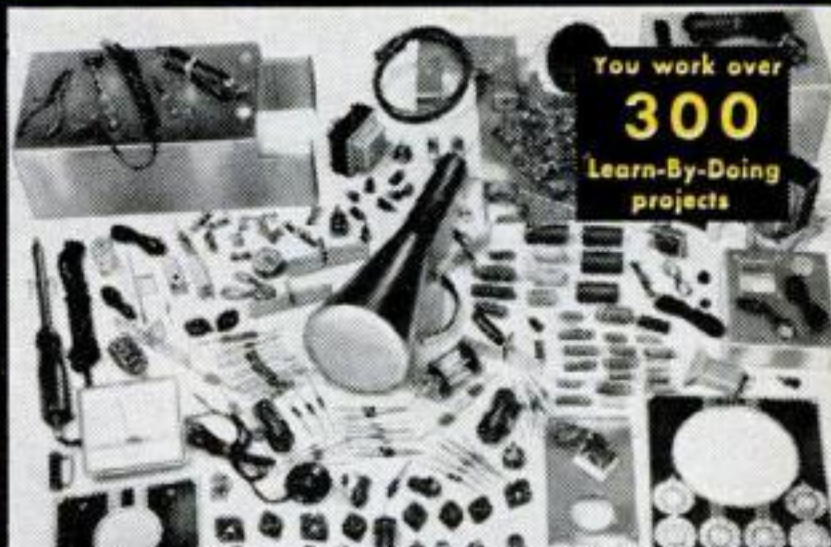
Accredited Member of National Home Study Council

"One of North America's Foremost Electronics Training Centers"



DeVRY TECHNICAL INSTITUTE

CHICAGO 41, ILLINOIS



You work over
300
Learn-By-Doing
projects

Build over 300 practical projects from many shipments of Radio-Electronic parts. You build and operate TV-Radio circuits . . . wireless microphone . . . and many other major projects—all designed to provide outstanding practical experience at home.

ACT NOW! Get information-packed publication FREE! Mail coupon today.

DeVRY TECHNICAL INSTITUTE

4141 Belmont Ave., Chicago 41, Ill., Dept. PS-10-Q

Please give me your FREE booklet, "Electronics in Space Travel," and tell me how I may prepare to enter one or more branches of Electronics.

Name _____ Age _____

PLEASE PRINT

Street _____ Apt. _____

City _____ Zone _____ State _____

2044 Canadian residents address: DeVry Tech of Canada, Ltd.
970 Lawrence Avenue West, Toronto 19, Ontario



garages, furnaces, watch repair,
garden equipment, taxicabs, bridal wear

whatever you need—



Advertisers displaying this emblem
make your shopping easy.

started on nomenclature, but Lehman should have done more research on the subject.

Years ago the terminology was "Inverted Converter," then "Converter" alone; now "Inverter." It depends on the person who makes the equipment or writes the text. I have a beautiful little "Inverted Converter" in my shop, 14-volt DC to 110-volt 400-cycle, of recent manufacture by a very famous company. The nameplate has engraved on it nine letters—CONVERTER.

J. H. O'CONNOR, Denver.

Watch That Sprinkler

ONE of your Short Cuts and Tips is a short cut to trouble. The writer who suggests using a pipe tee for a garden-hose branch [June, p. 124] is going to end up with peculiar watering patterns. Did you ever try to screw a hose connector into a pipe thread?

R. O. PORTER, Grayling, Mich.

Cars with Fluid Controls

DISCOVERING that fluid steering, fluid brakes, and fluid drive are soon to be joined by fluid controls ["The Month in Science," July] has disturbed me. If fluid-filled pipes are going to run our cars, what's going to happen to Gus Wil-



son? Don't tell me he'll be replaced by a plumber!

LEWIS T. SCOTT, Newark, N. J.

How Not to Use a Shaver Cord

RECENTLY I called a TV repairman and when he took off the back of the set he found he had left his plug-in cord at the shop. To save him a trip back, I got out my electric-shaver plug-in cord and to his surprise, it did the job fine. I offer this idea with my compliments to all fix-it-yourselfers who own an electric shaver.

FRANK POLAGE, Floral Park, N. Y.

Not really a fine idea. The light braid used on some shaver cords will not safely

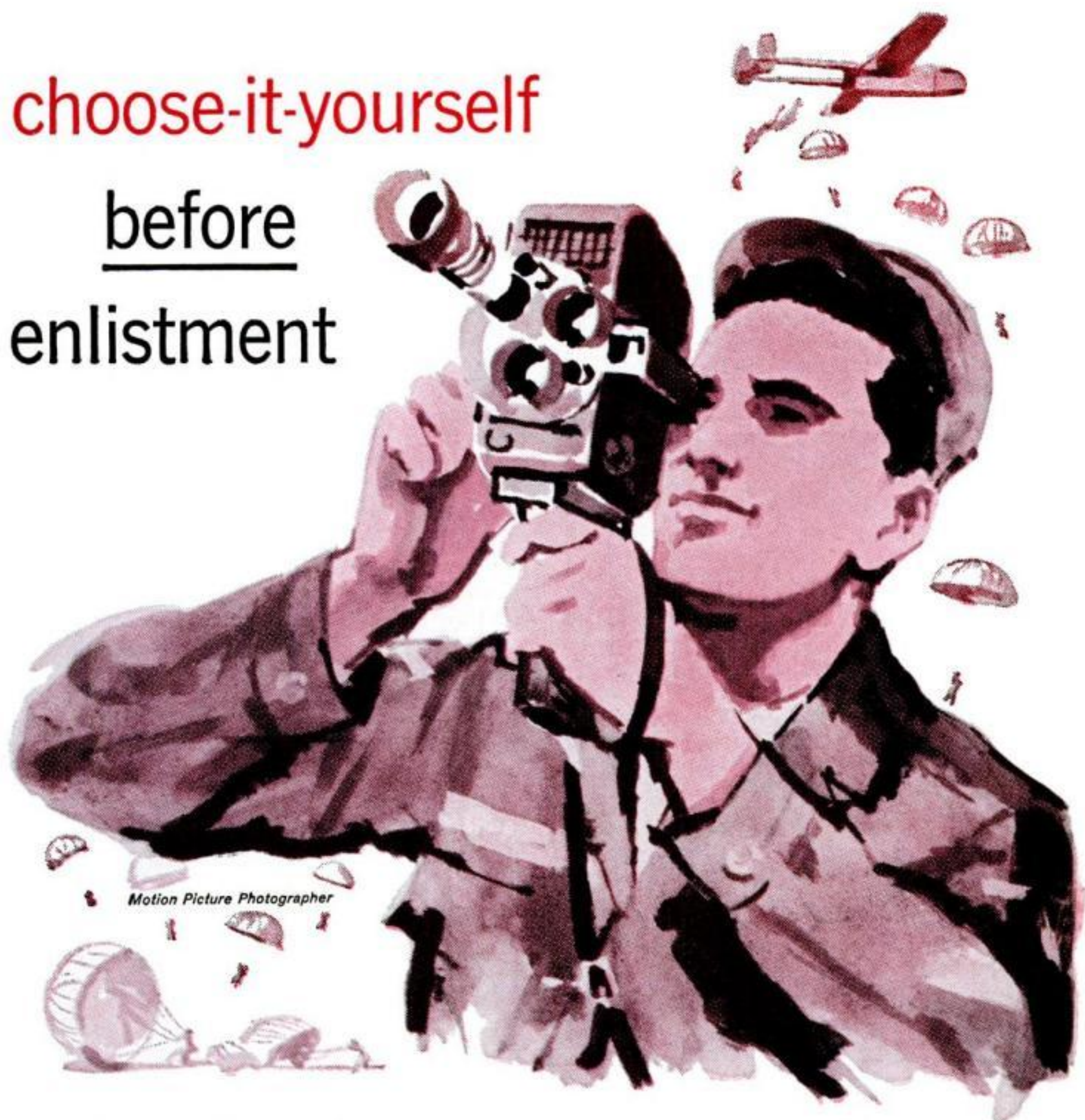
CONTINUED

want training in Photography? Mechanics? Electronics?

choose-it-yourself

before

enlistment



Motion Picture Photographer

It's up to you! The Army's new "Choose-it-Yourself" System lets you choose valuable training before you enlist. Here's how it works: **1. Choose** before enlistment. Choose your training from fields like Photography, Missiles, Communications, Construction, Automotives—and many more. **2. Qualify** before enlistment. Take aptitude and physical exams to qualify for the training you've chosen. **3. Know** before enlistment. If you qualify, you know you'll get the training you want. Your choice is written into your future Army record—guaranteed before you enlist. **Choose, qualify, know — this week!** Ask your Army recruiter to show you his complete list of available training fields.

CHOOSE IT



YOURSELF VOCATIONAL TRAINING SYSTEM

US ARMY

AUDELS GUIDES

FOR

MECHANICS & ENGINEERS

EARN MORE...LEARN MORE

No. 1	AUTOMOBILE MECHANICS GUIDE. 1696 Pages.....	\$ 6.00
No. 2	HOME APPLIANCE SERVICE GUIDE. 864 Pages.....	6.00
No. 3	TV & RADIO SERVICE LIBRARY. 2 Book Set.....	8.00
No. 4	HANDY BOOK OF ELECTRICITY. 1520 Pages.....	5.00
No. 5	TRUCK & TRACTOR GUIDE. 1376 Pages.....	5.00
No. 6	PLUMBERS & STEAMFITTERS GUIDES. 4 Book Set.....	8.00
No. 7	PAINTING & DECORATING MANUAL. 464 Pages.....	3.00
No. 8	CARPENTERS & BUILDERS GUIDES. 4 Book Set.....	8.00
No. 9	DIESEL ENGINE MANUAL. 640 Pages.....	3.00
No. 10	WELDERS GUIDE. 608 Pages.....	3.00
No. 11	MATHEMATICS MADE EASY. 752 Pages.....	3.00
No. 12	MACHINISTS & TOOLMAKERS HANDBOOK. 1728 Pages..	6.00
No. 13	WIRING DIAGRAMS. 304 Pages.....	2.00
No. 14	REFRIGERATION & AIR CONDITIONING. 1360 Pages.....	6.00
No. 15	ELECTRIC LIBRARY. 10 Volume Set.....	20.00
No. 25	BLUE PRINT READING. 448 Pages.....	3.00
No. 26	MASONS & BUILDERS GUIDES. 4 Book Set.....	8.00
No. 27	ELECTRIC MOTOR GUIDE. 1056 Pages.....	5.00
No. 28	OIL BURNER GUIDE. 416 Pages.....	2.00
No. 29	SHEET METAL PATTERN LAYOUTS. 1152 Pages.....	7.50
No. 30	SHEET METAL WORKERS HANDY BOOK. 448 Pages....	2.00
No. 31	MECHANICAL DRAWING GUIDE. 192 Pages.....	2.00
No. 32	MECHANICAL DRAWING & DESIGN. 480 Pages.....	3.00
No. 33	ELECTRONIC DEVICES. 304 Pages.....	3.00
No. 34	ELECTRICIANS EXAMINATIONS. 272 Pages.....	2.00
No. 35	ELECTRIC POWER CALCULATIONS. 480 Pages.....	3.00
No. 36	ELECTRIC DICTIONARY. 9000 Terms.....	3.00
No. 37	POWER PLANT ENGINEERS GUIDE. 1568 Pages.....	5.00
No. 38	ENGINEERS AND FIREMAINS EXAMS. 544 Pages.....	2.00
No. 40	PUMPS, HYDRAULICS & AIR COMPRESSORS. 1760 Pages	6.00
No. 41	HOUSE HEATING GUIDE. 1008 Pages.....	5.00
No. 42	MILLWRIGHTS & MECHANICS GUIDE. 1248 Pages.....	5.00
No. 43	DO-IT-YOURSELF ENCYCLOPEDIA. 2 Book Set.....	8.95
No. 44	NEW MECHANICAL DICTIONARY. 712 Pages.....	6.95

7-DAY FREE EXAMINATION

SEND NO MONEY — Pay the postman nothing! We'll send you any of the Audel Guides for FREE examination in your home. If you decide to keep the books you may pay for them under our easy-pay plan of only \$2 a month.

HERE IS ALL YOU DO

IT'S EASY TO ORDER! In the No-Risk Mail Order Coupon below you need only draw a circle around the number of Audel Guides you want. We will send them to you at once. If you are not completely satisfied, return the books to us.

MAIL THIS COUPON TODAY!

THEO. AUDEL & CO. — Self Improvement Publishers Since 1879
49 W 23rd Street, New York 10, N. Y.

\$10

Please mail me for 7 days' FREE EXAMINATION the books I have circled. I agree to mail \$2 in 7 days on each book or set ordered, and to further mail \$2 a month on each book or set ordered until I have paid the purchase price, plus shipping costs. If I am not completely satisfied with my Audel Guides I may return them.

NAME _____

ADDRESS _____

OCCUPATION _____

EMPLOYED BY _____

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 25 26 27

28 29 30 31 32 33 34 35 36 37 38 40 41 42 43 44

☐ **SAVE SHIPPING COSTS!** Check here if you enclose complete payment with order. We pay postage charges. You have same return privilege

carry the current required by a TV set. And the high voltage inside the set can bite the unwary.

Train Going Nowhere Fast

LAST spring you had plans for building a "Train That Goes Nowhere" [April]. Two weeks ago I got around to building the table and here's a picture of how my train looks.



I had a lot of fun with this project. The whole thing cost me about \$20. The modern locomotives I had on my layout didn't do so well on the table so I bought one of the older models. It works fine.

JAMES STEFFNER, Rocky River, Ohio.

New Feats for Old Socks

A SENSIBLE question is entitled to a practical answer, so here's mine to the fellow who wants to use up his worn-out old socks [June letters]:

Cut the feet off and pull the tops over old fruit jars. Freeze in the deep freeze. Break out the glass and you've got pre-fabricated post holes ready to plant. With good advertising and bright display packaging, these could prove to be a fast seller. I'd almost bet that merchants would have trouble keeping them on their shelves. I give you the idea free and wish you luck with this handy-dandy business venture.

J. C. SHOLBERG JR., Lake Stevens, Wash.

... UNLESS he has small feet and big hands, Sanders can use his old socks as polishing mittens—good for furniture, car, or Venetian blinds.

H. L. KEENES, Snoqualmie, Wash.

... CUT them down the center of the back and use them as grease rags.

SAM WICKHAM, Flagler, Colo.

... SNIP off the tops and get your wife

NOW! Vitamin-Quota's Glorious

2-FOR-1 SALE

of PLEMS—America's Favorite Food Supplement!

Over 100,000,000 tablets already used

You bought these at a cost of less than 2½¢ a day and it was a tremendous bargain! Now get your Plems for the unheard-of cost of less than 1¼¢ a day!

16 VITAMINS in a single tablet

9 MINERALS in a single tablet

Including the important "Red" Vitamin B₁₂ Along With Other Stimulants for the Growth of

RED BLOOD cells

Try this Freshly-Packed, Guaranteed-Potency, all-Vitamin-Mineral Formula, containing 25 nutritional factors, not at the usual low cost of only \$2.35 for 100 tablets, but at the sensational limited-time offer of only \$2.35 for 200 tablets, over 6 months' supply — one a day is an adequate dose.



2 BOTTLES of
100 TABLETS Each

Only **\$2.35**

on Special, Limited-Time,

2-FOR-1 SALE!

This offer good on first order only

Each Freshly-Packed, Guaranteed-Potency PLEMS tablet contains:

Vit. A	5000 USP un.	Vitamin B-2	2 Mg.	Cal. Panto	3 Mg.	Choline	10 Mg.
Vit. D	1600 USP un.	Vit. B-6	0.5 Mg.	Niacinamide	20 Mg.	Inositol	10 Mg.
Vitamin B-12	2 Mcg.	Copper	1 Mg.	Vitamin K	0.2 Mg.	Iodine	0.15 Mg.
Folic Acid	0.3 Mg.	Calcium	143 Mg.	Vitamin E	1.25 I.U.	Potassium	5 Mg.
Vitamin C	50 Mg.	Iron	15 Mg.	Biotin	1 Mcg.	Zinc	1 Mg.
Vitamin B-1	5 Mg.	Manganese	1 Mg.	Rutin	1 Mg.	Magnesium	10 Mg.
		Phosphorus	110 Mg.				

2 BOTTLES of 100 **\$2.35**

2 BOTTLES of 250 **\$5.25**

2 BOTTLES of 500 **\$10.00**

2 BOTTLES of 1,000 **\$19.00**

Tests prove that no comparable, nationally advertised formula surpasses Plems in value and potency. They contain vitamin potencies that exceed minimum daily adult requirements.

YOUR PURCHASE IS FREE IF THESE SENSATIONAL VALUES CAN BE DUPLICATED ANYWHERE



For over 37 years Vitamin-Quota has saved money for doctors, hospitals and over 2,500,000 families coast-to-coast. BUY IN CONFIDENCE! All orders supervised by Qualified Pharmacists.

PLEMS are sold only at the addresses below. Order C. O. D. or save all charges by sending check or money order. We pay all postage. MONEY BACK IF NOT SATISFIED.

1923-1960

VITAMIN-QUOTA

37th Year

Prescription Specialists and one of the world's largest distributors of Vitamins. Established 1923.

Dept. A-128, 880 Broadway, New York 3, N. Y., or

Dept. A-128, 1125 S. Crenshaw Boulevard, Los Angeles 19, Calif.

Sales in California add 4% to total of order



**MEN! Make up to
\$1,000⁰⁰
IN A MONTH!**

without "SELLING"

Sensational Demand for Low-Priced Fire Alarm PLUS Sure-Fire "No-Selling" Plan Offers Ambitious Men Huge Profit Opportunities

AMAZING NEW INVENTION



Even beginners who never sold anything in their lives are cleaning up unbelievable profits with the first practical effective, low priced Fire Alarm ever invented . . . needed, wanted in homes, factories, offices, stores, on farms, for boats, everywhere. Professional salesmen are making biggest profits in years! Later in this ad I'll tell you about the plan that's producing orders for 1 to 12 Fire Alarms per sale from 8 out of 10 prospects . . . without selling. Here are the facts about the Fire Alarm. It hangs on the wall like a picture—no wiring, no installation. It's always on guard . . . It 'smells' a fire before danger point. When temperature rises, Fire Alarm goes off automatically howls loud warning that can be heard 1/5 mile wakes up soundest sleeper, give precious time to put out fire, call fire department, or escape. And it sells for only \$4.95 with profit up to \$2.70 on each one.

**Nearest Thing to
AUTOMATION SELLING**

With our field-tested plan customers sell themselves. No cold canvassing. No hard selling. It's the nearest thing to 'Automation Selling.' Imagine a sales plan even a child can use successfully because the sales tools we give you (and which you leave with your prospects) do all your selling even while you sleep! No room here to give you all the details but if you want big money fast rush the coupon now.

**Make This
Lighted-Match
Demonstration**

Sensitive! Lighted match triggers Alarms in 3 seconds.

Free Sales Kit

Send no money. Just rush coupon below for all the exciting moneymaking facts, complete Illustrated Sales Kit, everything you need to make money your first day. Learn how selling only 20 Fire Alarms a day pays you

Made \$26.52
in 3 Hours!

"Received first shipment about noon. Worked 3 hours and made \$26.52 profit. It's a terrific seller!"

—Stanley



\$1,080.00 profit in a month. No competition anywhere. Get in on the ground floor now. Rush this coupon.

MERLITE INDUSTRIES, Inc.

(ALARM DIVISION)

114 E. 32nd St., Dept. F-16U

New York 16, N. Y.

ALVIN WESLEY, Sales Manager
Merlite Industries, Inc. (Alarm Division)
114 E. 32nd St., Dept. F-16U, New York 16, N. Y.

Rush FREE SALES KIT and full details about your "No-Selling" plan which gives me opportunity to make up to \$1,000.00 in a month without cold canvassing and hard selling—automatically. I am not obligated.

Name _____

Address _____

City _____ Zone _____ State _____

In Canada: Mopa Co., Ltd., 371 Dowd St., Montreal 1, P.Q.

to sew them into jacket and coat sleeves that lack windbreakers.

VERNA HOWARD, Rockford, Ill.

. . . CUT the feet off at the heel line and use the rest of the socks to protect shirt cuffs and wrists from grease and grime when working on the car.

H. M. OSBORN, Riverside, Calif.

. . . STICK your hand in a sock, pull another on over the first and continue this, using as many socks as needed to make a sausage-shaped pad. Wherever you need padding or cushioning, you've got it. This also makes a good sleeping companion for a puppy just separated from the litter.



LEO MOL, Keyport, N. J.

. . . SLIP them over the top of a ladder to protect house siding from being marked.

F. L. JONES, Chicago.

. . . USE nylon socks for straining paint or enamel.

CALVIN HODGE, Boston.

. . . SAVE the soft, cotton ones to buff with after shining your shoes or polishing the household brass.

JERRY MULTON, Chicago.

. . . HAVE your wife sew shut the upper sections, after cutting off the feet, and you have fine covers for the heads of golf clubs.

E. L. WEST, Mannington, W. Va.

Hudson's Backstop Brakes

A JUNE letter writer asks why somebody doesn't offer auxiliary mechanical brakes on cars, to take over if the hydraulics fail.

From 1948 or earlier, until their demise in 1957, Hudsons were so equipped. The system operated on the rear wheels only, through the emergency-brake cables. It came into play when the brake pedal was pushed within about an inch of the floor. Even though it worked on only two wheels, it was certainly effective, as many Hudson owners will testify.

KERVYN MACH, Wagner, S. D.

. . . THAT brake-inventing fellow is talking about the Hudson system—the

DON'T BE HALF-TRAINED...

Be A MASTER TECHNICIAN
In One Of
AMERICA'S BIG 3 INDUSTRIES



train
at home
in
spare
time

FREE BOOK

TELEVISION RADIO-ELECTRONICS



Business of Your Own or High-Pay Career in...
Service & Repair
Broadcasting & Communications
Hi-Fi & Stereo Sound Systems
Electronics for Guided Missiles
TV-Radio Manufacturing

Industrial Electronics
Automation & Computers
Radar & Micro Waves
TV-Radio Sales
FCC License Preparation

Includes...
**RADIO SET
TV SET
MULTITESTER**

MAKE MORE MONEY

**A Successful Career... Security...
Are Yours NOW in Modern Industry!**

RIGHT NOW IS THE BEST TIME for you to get into the field of your choice! You can be a part of its growth, you can increase your earning power, you can really build a Successful, Secure Future. Send coupon for complete facts by mail. NO SALESMAN WILL CALL!!!

N.T.S. TRAINS YOU RIGHT, FAST and EASY! Incomplete "short-cut" training limits your earning power, disqualifies you for top-pay jobs. N.T.S. Shop, Tested Home Training is..

- ★ BETTER—classroom developed, lab and shop-tested, industry-approved, home study designed.
- ★ MORE COMPLETE—you learn All Phases and you receive Everything You Need for Success...
- ★ LOWER COST—One Master Course at One Low Tuition gives you more training at lower cost.

TRAINING PAYS FOR ITSELF AND MORE... Earn your tuition—and more—while in training. We'll show you how. Many students have...so can you!

RESIDENT TRAINING AT LOS ANGELES
If you wish to take your training in our Resident School in Los Angeles, start NOW in our big, modern Shops and Labs. Here you work with latest equipment, finest and most complete facilities offered by any school. Expert, friendly instructors. Personal attention. Help in finding home near school... and part time job while you learn. Check box in coupon for full information.



NATIONAL TECHNICAL SCHOOLS
World-Wide Training Since 1905
4000 South Figueroa Street
Los Angeles 37, Calif., U.S.A.

GET THE BENEFIT OF OUR OVER 50 YEARS EXPERIENCE

AUTO MECHANICS & DIESEL



Business of Your Own or High-Pay Career in...
Service & Maintenance
Motor Tune-Up
Automatic Transmissions
Diesel & Fuel Injection
Overhauling & Rebuilding

Automobile Air Conditioning
Electrical Systems
Automatic Power Devices
Industrial & Marine Engines
Foreign Car Sales & Service

Includes...
**TOOLS
SOCKET SET
ANALYZERS**

AIR CONDITIONING REFRIGERATION ELECTRICAL APPLIANCES



Business of Your Own or High-Pay Career in...
Air Conditioning—Refrigeration
• Domestic & Commercial
• Industrial & Mobile
Installation & Contracting
Automobile Air Conditioning

Electrical Appliances
• Small & Major
• Heating, Motor & Combination
Sales, Service & Repair
Manufacturing & Distribution

Includes...
**TOOLS
GAUGES
TESTER**

CHOOSE YOUR FIELD. SELECT ONE OF THE "BIG 3" NOW. CHECK COURSE DESIRED

Mail One of These
2 Coupons TODAY
for

**FREE BOOK
and
ACTUAL LESSON**

Ask a Friend
to Send the Other.
It's Fun to
Study Together!

**NO OBLIGATION...
NO INCONVENIENCE...
NO SALESMAN WILL
CALL ON YOU!!!**

NATIONAL TECHNICAL SCHOOLS

WORLD-WIDE TRAINING SINCE 1905

National Technical Schools, Dept. C-100
4000 S. Figueroa St., Los Angeles 37, Calif.

Please rush FREE Book and Actual Lesson checked below. No obligation. No salesman will call.

- ☐ TV-Radio-Electronics Book
☐ Auto-Mechanics & Diesel Book
☐ Air Conditioning, Refrigeration & Electrical Appliance Book

CHECK ONE

CHECK ONE

Name _____ Age _____

Address _____

City _____ Zone _____ State _____

☐ Check here if interested ONLY in Resident Training at L.A.
VETERANS: Give date of discharge _____ N310F

NATIONAL TECHNICAL SCHOOLS

WORLD-WIDE TRAINING SINCE 1905

National Technical Schools, Dept. C-100
4000 S. Figueroa St., Los Angeles 37, Calif.

Please rush FREE Book and Actual Lesson checked below. No obligation. No salesman will call.

- ☐ TV-Radio-Electronics Book
☐ Auto-Mechanics & Diesel Book
☐ Air Conditioning, Refrigeration & Electrical Appliance Book

CHECK ONE

CHECK ONE

Name _____ Age _____

Address _____

City _____ Zone _____ State _____

☐ Check here if interested ONLY in Resident Training at L.A.
VETERANS: Give date of discharge _____ N310

best setup for braking. I was fortunate to have the extra brake on my Hudson when a wheel cylinder went out and the mechanical brakes took over.

ARNO SCHWARZE, Ft. Wayne, Ind.

Flyer Count Stepped Up

HERE is a photograph of what, by your count of such known conveyances ["The



World's First Sports Car," June], must be Flyer No. 8. This particular one is believed to be a Briggs & Stratton (both body and motor). Although of uncertain vintage, it's in excellent running order.

S. G. TAYLOR, S. Dartmouth, Mass.

... I OWN a 1921 Flyer. A hand-me-down through the family, it is in almost completely restored condition and was

licensed up until last April. I still have the original bill of sale and many spare parts for the 1½-hp. engine.

Your listing of other owners should be most helpful for trading parts. My thanks for your article—the first I've ever seen on the subject.

BILL SCHROEDER, Summit, N. J.

Adding the Flyer owned by Elliott Neuberg of Chicago ["PS Readers Talk Back," Sept.], the count jumps to 11.

Freeze It, It's Still Fast

REPLYING to one of your letter writers [July], you say that cold has no influence on the speed of light. Under the circumstances he describes, I think you'll find it has—unless my 25-year-old physics has turned sour.

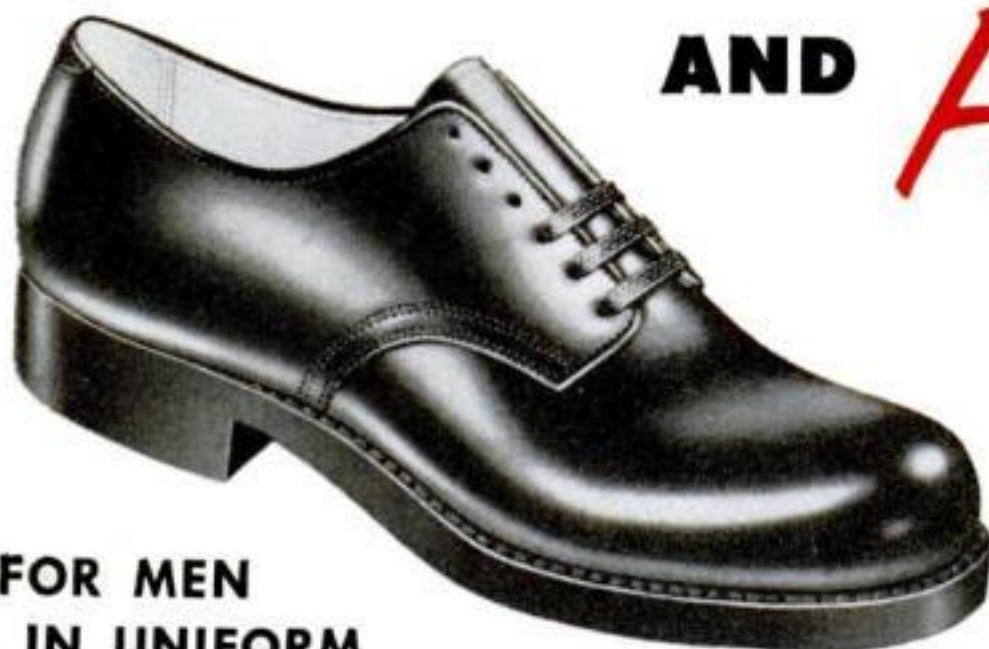
Light slows down when it travels through liquid, gas, or clear solids like glass. Otherwise we'd have no refraction in water, mirages in the desert, or lens systems. We wouldn't be able to see (or we'd have pinhole "lenses").

And if cold makes the gas or liquid more dense, it would have the effect of increasing the slowing effect, causing the

WEAR RED WING SHOES

AND

FEEL FIT



Feel new comfort, new fit. Know new pleasure from the moment you put them on. Red Wing — *perfect fitting shoes*. Fit your work, fit you. Choose 6", - 8", oxfords, pull-ons.

Illustrated No. 104. Black Dresides uppers, cushion insoles. Also available No. 131 — 6" Black Dresides, singer mocassin toe.

RED WING
SHOES



and get REAL Red Wing's
in Boys' Sizes Too

JUST LIKE DAD'S

At your Red Wing Dealer or Write for his name
RED WING SHOE CO. • 195-A MAIN STREET • RED WING, MINNESOTA

light to bend more on entry. Or is there something I missed?

TOM BOOZ, Fullerton, Calif.

What we said was correct. Temperature, in itself, has no effect on the velocity of light. The density of the transmitting medium does, of course. So there will be a connection between temperature and light velocity when light travels through any substance.

Bring Back the Horseless Buggy

LIKE the June letter writer, I too like the idea of an electric buggy; but on design we part company. The Fiat 500 with sun top seems to me a better basic design for a lightweight car than the curved-dash Oldsmobile.

Part of the frame strength could be in the top members and these could be spread to give some of the weather protection of the old-fashioned auto top, eliminating roll-up glass windows. A two-passenger seating pattern like that of the Scripps-Booth car (the driver a bit in advance of the passenger) would save weight.

E. C. BLACK, Columbia, S. C.

Is Detroit Selling Kits?

My '53 Lincoln, a solid and satisfactory piece of machinery, needed new main bearings after 102,000 miles. Pondering a new car, I questioned friends who had bought cars recently.

One person that I talked with said he had had to go back to the dealer every week for two months to get his new car running right. Another man told me that the door handle came off in his hand the day he drove his treasure home. And a third spent \$4,000 for a car that he says is "remarkable for the way it lets water drain in and gasoline drain out."

Now I'd like to buy an American car—a good-sized, comfortable, powerful car that I can drive for 100,000 miles. But I'll be hanged if I'll spend \$4,000 for a kit of do-it-yourself parts, loosely screwed together, that can't be called an automobile until a dealer has worked over it for months. For me the solution has been a rebuilt engine.

When that gives out, in 1965 or 1966, maybe Detroit will be back to building cars, not kits.

THOMAS G. APPEL, Pleasantville, N. Y.

LOOKING FOR LONG WEAR IN SERVICE SHOES?

TRY RED WING SERVICE OXFORDS SHOES

WITH NEOPRENE SOLES!



Neoprene soles give long wear...
resist oil, grease, chemicals
and cold weather cracking.
Neoprene soles are resilient...
cushion each step...help make
standing jobs less tiring.

*Ask for neoprene soles
the next time
you buy service shoes.*



BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP



AMAZING SCIENCE BUYS

for FUN, STUDY or PROFIT



See the Stars, Moon, Planets Close Up!

3" ASTRONOMICAL REFLECTING TELESCOPE

60 to 180 Power—Famous Mt. Palomar Type! An Unusual Buy!



Assembled—Ready to use! You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail. Galaxies! Equatorial mount with lock on both axes. Aluminumized and over-coated 3" diameter high-speed f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 180 power. Low-cost accessory eyepiece available for higher powers. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod. FREE with Scope:

—Valuable **STAR CHART** plus 272 page "**HANDBOOK OF HEAVENS**" plus "**HOW TO USE YOUR TELESCOPE**" BOOK. Stock No. 85,050-N\$29.95 postpaid

KNOW THE TRUTH ABOUT POWER. Telescope experts will confirm that an Astronomical Telescope will only give you practical powers to about 50 or 60 times per inch of objective diameter—powers above this only produce empty magnification—make viewing dim, difficult and unsatisfactory.

4 1/4" ASTRONOMICAL TELESCOPE!

New Vibration Free Metal Pedestal Mount

UP TO 255 POWER!



With this scope you can see everything as above but with greater power plus will split finer stars. Mirror has twice the light gathering power. Mirror guaranteed to give theoretical limit of resolution. Rack and pinion focusing, real equatorial mounting—only one adjustment follows stars! Aluminum tube, 6 power finder telescope, 2 standard size eyepieces and mounted Barlow lens give you powers of 40X, 90X, 120X, and 255X. Low-cost accessory eyepiece available for higher powers. FREE with Scope.—Valuable **STAR CHART** plus 272 page "**HANDBOOK OF HEAVENS**" plus "**HOW TO USE YOUR TELESCOPE**" BOOK. Shipping weight 25 lbs.

Stock No. 85,105-N.....\$79.50 f.o.b.

Same Telescope as above but equipped with Electric Clock Drive—Stock No. 85,107-N.....\$109.00 f.o.b. Barrington, N. J.

GIANT OPTICAL BARGAIN KIT

You get: PRISM; DIFFRACTION GRATING; POLARIZING FILTERS; 5 LENSES DOUBLE-CONVEX, 14 x 48mm; "FUN WITH OPTICS" 32-page instruction book; "BEGINNER'S LENS KIT," 10 lenses to make many optical items; "STAR & SATELLITE PATHFINDER" instruction book; RECTANGULAR MAGNIFIER. An excellent value.

Stock No. 50,204-N.....\$3.00 Postpaid



NEW BINOCULAR-TO-CAMERA HOLDER

For Exciting Telephoto Pictures



Will fit any camera. Bring distant objects 7 times nearer with a 35 mm. camera. 7x50 binocular and our NEW BINOCULAR-TO-CAMERA HOLDER. Ideal for long-range shots of wild life, planes, ships, people, etc. Camera and binoculars attach easily. Use any binocular or monocular—any camera, still or movie. Take color or black and white. Full directions for taking telephotos.

Stock No. 70,223-N.....\$11.50 Postpaid

BUILD A SOLAR ENERGY FURNACE

A fascinating new field. Build your own Solar Furnace for experimentation—many practical uses. Easy! Inexpensive! Use scrapwood! We furnish instructions. This sun powered furnace will generate terrific heat—2000° to 3000°.

Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens—14" diameter . . . f.l. 14".

Stock No. 70,130-N . . . Fresnel Lens . . . \$6.00 Postpaid



ASTRO-COMPASS AND TRANSIT

War surplus! Astro Compass alone cost Govt. \$75. We have added a Sighting Level to improve versatility. Hundreds of uses in carpentry, brick laying, foundation work, grading, irrigation or drainage. Much below cost of ordinary surveying instruments. Ideal for do-it-yourselfers. 10 1/4" high, 6" long, 4" wide. Adjustable leveling platform—2 spirit levels for aligning—also spirit level in sighting attachment. A tremendous bargain.

Stock No. 70,267-N.....\$19.95 postpaid

SPECIAL! SPECIAL! Terrific Buy! American Made!

OPAQUE PROJECTOR



Projects illustrations up to 3" x 3 1/2" and enlarges them. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current. 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4 1/2" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.

Stock No. 70,199-N.....\$7.95 postpaid

CIRCULAR DIFFRACTION-GRATING JEWELRY

A Dazzling Rainbow of Color!



Shimmering rainbows of gemlike color in jewelry of exquisite beauty—made with CIRCULAR DIFFRACTION-GRATING REPLICA. Just as a prism breaks up light into its full range of individual colors, so does the diffraction grating.

Stock No. 30,349-N—Earrings	\$2.75	Pstpd.
Stock No. 30,350-N—Cuff Links	\$2.75	Pstpd.
Stock No. 30,372-N—Pendant	\$2.75	Pstpd.
Stock No. 30,373-N—2 Pins	\$2.75	Pstpd.
Stock No. 30,390-N—Tie-Clasp	\$2.75	Pstpd.

Take Telephoto Shots Thru 7x50 MONOCULAR

This is fine quality, American made instrument—war surplus! Actually 1 1/2 of U. S. Govt. 7 x 50 Binocular. Used for general observation both day and night and to take fascinating telephoto shots with your camera. Brand new. Due to Japanese competition we close these out at a bargain price. Directions and mounting hints included.

Stock No. 50,003-N.....\$15.00 Postpaid



War Surplus American-Made 7x50 Binoculars

Big savings! Brand new! Crystal clear viewing—7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7mm. Approx. field at 1,000 yds. is 376 ft. Carrying case included. American 7 x 50's normally cost \$195. Our war surplus price saves you real money.

Stock No. 1533-N.....only \$55.00 pstpd. (Tax included)



NEW! CIRCULAR SLIDE RULE!

Pocket Size—Fast—Easy to Use!

Be a Math Whiz! New Circular Slide Rule multiplies, divides, figures fractions, percentages, squares, cubes, roots, proportions, circumferences, areas, retail prices, fuel consumption. Eliminates the confusions of ordinary slide-rules. Directions included.

Stock No. 30,336-N.....\$4.95 postpaid



BLACK LIGHT MAGIC-GLOW KIT

Kit uses long-wave blacklight, which is completely harmless to eyes, but causes fluorescence in over 3,000 substances. Includes Magic Glow Lamp, stand, invisible water paints and ink, fluorescent crayon, tracer powder, pen, 3 brushes, specimens of fluorescent rocks: wernerite from Canada, fluorite from England, willemite from U.S.A.



Stock No. 70,256-N.....\$10.95 Pstpd.

NEW! PENNY-PER-YEAR NITE LITE

First commercial application of amazing "cold light." Electroluminescent Nite Lite plugs into any socket, operates continually for 5 years at cost of only a penny per year, compared to 2c per week for standard night light. 3-inch round light illuminates key holes, light switches, etc. Ideal introduction to electroluminescence for classes, experimenters. "How to Use" sheet included.

Stock No. 50,350-N.....Set of 3.....\$3.00 postpaid

FREE CATALOG-N

128 Pages! over 1000 Bargains!

Complete line of Astronomical Telescope parts and assembled Telescopes. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories. Telescopes, microscopes, binoculars, infrared sniperscopes, science experiment items, math learning and teaching aids.

REQUEST CATALOG-N

EASY PAYMENT PLAN AVAILABLE! DETAILS WITH CATALOG!



ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO. BARRINGTON, NEW JERSEY

The month in science

Ruby that amplifies light. Take a pink rod of ruby crystal . . . flash powerful green light on it . . . shine a weak flicker of red light at one end . . . and out the other end bursts strong red light—the purest, most brilliant red anyone has ever seen.



SPIRAL LAMP surrounding ruby rod provides energy that makes new light amplifier operate.

This is a light amplifier, the first ever made. It does for light waves what a vacuum tube does for radio waves (light waves are the same as radio waves, of course, just a billion times smaller). A weak signal (the red flicker) controls a powerful output (the red burst). The "power supply," which sustains the output, is the green light.

The whole thing is as big as a water glass. Its name: laser (stands for "light amplification by stimulated emission of radiation"). It was invented by Hughes Aircraft's young (33) physicist, Dr. Theodore H. Maiman, working along lines pioneered by Prof. Charles H. Townes of Columbia (inventor of the maser, for amplifying very short radio waves).

What good is it? Look:

- Television and radio could be broadcast on beams of light waves. The advantage: capacity. Light waves can handle much more traffic because they are so much shorter. Every city could have any number of TV and ra-

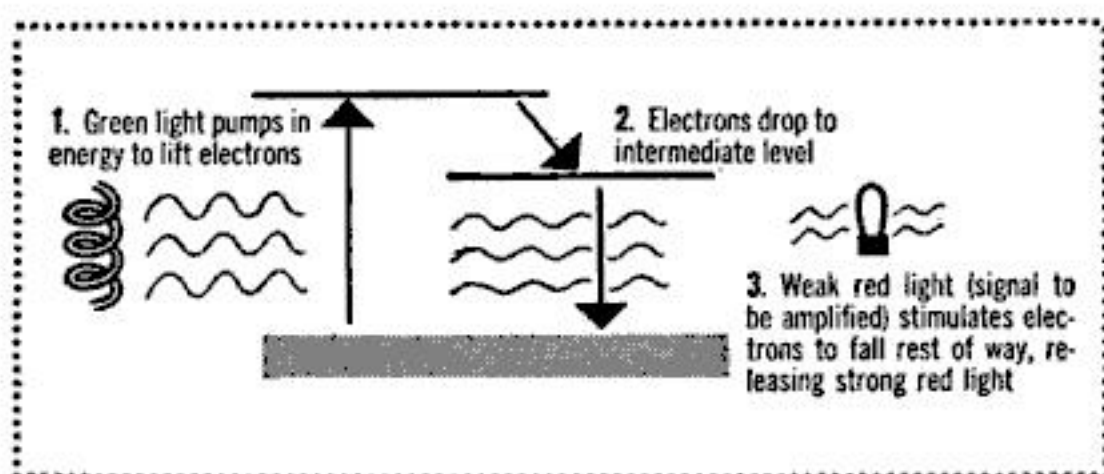
dio stations broadcasting without interference. Transmitting stations would be a spectacular sight, flashing colors like huge, gaudy neon signs.

- Radar that used waves of light would be much more accurate. The short waves would give detailed pictures on the scope—like TV pictures—instead of just pips of light.
- Fantastic searchlights could be made. Light comes out of the laser in an almost perfectly sharp beam that can be focused into a very small spot. If a laser were set up in Los Angeles and focused on San Francisco, its spot of light would spread to only 100 feet in all that distance. An ordinary searchlight beam would spread to a width of 50 miles.
- A death ray is another possibility. The laser's beam can be focused so sharply that a fantastic amount of energy is con-

The month in science continued

centrated into a pinpoint. It would certainly cook bacteria—to sterilize utensils—and maybe kill people as well.

The laser is another prize won with scientists' new-found ability to make solid crystals perform very useful tricks. The ruby crystal is painstakingly grown to contain just the right atoms in just the right places. Inside it, electrons—the tiny, negatively charged parts of atoms—gain and lose energy. They gain energy by taking it from light waves; they lose energy by throwing out light waves. Regulating these gains and losses makes the ruby amplify. Here's how:



1. The green light "pumps in" power, raising the energies of many electrons to one particular high level. Scientists visualize the electrons being lifted, bodily, from a valley floor to a ledge on a cliff (this is only an analogy, not a literally true picture).

2. These electrons quickly fall from the high ledge to one a bit lower down. This loss in energy is just wasted.

3. The electrons will stay at the new, lower level indefinitely. But if just a few new electrons come up from the valley floor to that ledge (boosted up by the faint signal input), the newcomers push the whole crowd off. All electrons at that halfway level fall to the valley floor together. They all lose energy together, and this loss appears as a strong burst of pure red light—the output.

The first laser works only with green "pumping" light and a red input—it is a single-frequency amplifier. Tunable lasers that operate over a range of frequencies (or colors) are being worked on.

And how happy are you? The image of the American family lounging around the back-yard swimming pool in a rosy glow of togetherness is pretty close to right. That's the finding of a nationwide study conducted by the University of Michigan Survey Research Center at the request of Congress (and detailed in a new book *Americans View Their Mental Health*, Basic Books, NYC, \$7.50).

The interviewers found only one adult in ten admitting that he was "not too happy." More than half the people asked were "pretty happy," and one in three was "very happy." The things they were happy about: family life and material comforts—"enough money, no debts, a nice home."

There's often a dark cloud near this sunny picture, however. Money again. Almost half the people expressed concern about finances. The worst worriers were those in the middle brackets (annual incomes \$3,000 to \$6,000). Apparently the rich don't need to worry about money, and the poor have given up.

**Courses in Radio and
Electronic Fundamentals –
TV Servicing – Color TV –
Electronics for
Automation –
Transistors**



RCA Institutes, one of the leading technical institutes in the United States devoted exclusively to electronics, offers the finest training-at-home. The very name "RCA" means dependability, integrity, and scientific advance. Practical work with your very first lesson. Pay as you learn. *No monthly installment payments.* You pay for your next study group only when you order it. Remember, in electronics, the more you know the higher you go! Licensed by the New York State Education Dept.



RCA INSTITUTES, INC.,
A Service of Radio Corporation of America
350 West Fourth Street, New York 14, N. Y.

**The Most Trusted Name
in Electronics**

[Resident School Courses in Los Angeles and New York City offer comprehensive training in Television and Electronics. Day and Evening classes. Free Placement Service. Catalog free on request.]

SEND FOR THIS FREE 64-PAGE BOOK TODAY!

RCA INSTITUTES, INC., Home Study School Dept. PS-X0
350 West Fourth Street, New York 14, N. Y.

Please rush me your FREE illustrated 64-page book describing your electronic training programs. No obligation. No salesman will call.

Name _____ Age _____

(please print)

Address _____

City _____ Zone _____ State _____

Korean Vets: Enter discharge date _____

Canadians—Take advantage of these same RCA Institutes courses at no additional cost. No postage, no customs, no delay. Send coupon to: RCA Victor Company, Ltd., 5581 Royalmount Ave., Montreal 9, Quebec

PS Puzzlers By Joan Steen

Some hurdles for the nimble-witted . . . Answers on page 234



Can You Get the World on a String?

MY TASTE in puzzles runs to ones that defy common sense. They startle you into realizing that often what you think should happen doesn't at all. Take this one about the world:

Imagine you have a string 25,000 miles long, just big enough to tie around the world at the equator. You proceed to do just that, carefully pulling the line taut.

You find that you've miscalculated slightly and have one extra yard of string. You decide to fasten the ends together anyway and fudge the extra 36 inches by distributing the slack along the whole length. You figure, quite naturally, that no one will ever notice.

Yet you'd have to be blind not to, because what in fact will happen?



A CLASSIC in the group of logical puzzles is the story of the king and three suitors. The king decided his lovely princess should marry one of them, and to pick out the cleverest he proposed this test:

To each suitor in turn he said, "I may or may not make a mark on each of your foreheads. I will then sit you around a table. Any suitor who sees a mark on any other forehead is to raise his hand. As soon as one of you figures out if he has or hasn't a mark, he should report to me."

There is much cogitation. And then one suitor shouts that he knows he has a mark. How did he come to this conclusion?



PING-PONG, anyone? It was Sunday afternoon, the last game of the last match in the neighborhood table-tennis tournament. A hard slice bounced the ball off the garage door, hopelessly denting the ball.

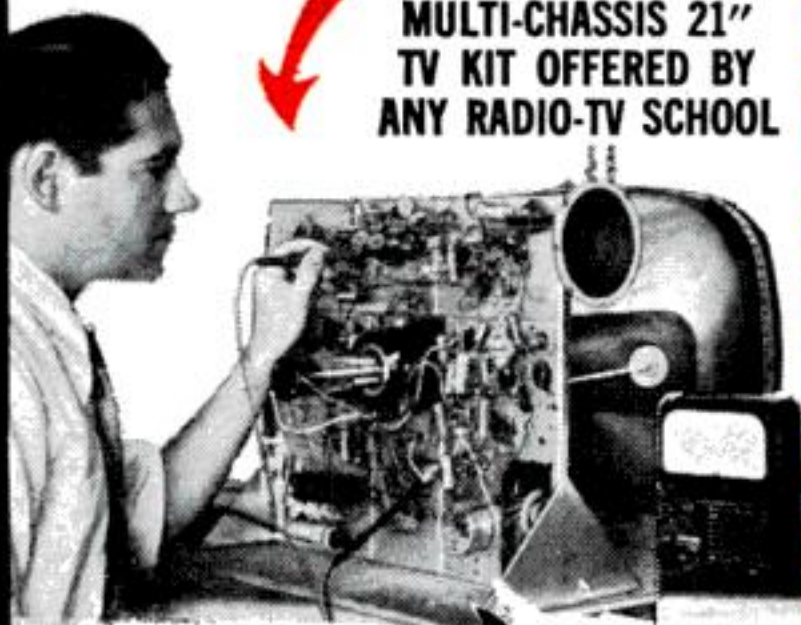
"Uh-uh," said Bill to his partner Jim. "That's our last ball." He turned to the crowd. "Anyone got any ideas how to fix it? Can't

Here's The Offer No Other Radio-TV School DARES MAKE!

LEARN AT HOME in Spare Time!

YOU DO MANY PRACTICAL JOBS with the kits we send you. That's right, you PRACTICE what we TEACH! You build a Signal Generator, AC-DC Power Pack, and AC-DC Superheterodyne Radio Receiver and top quality 21 inch TV Set. EARN AS YOU LEARN with the famous RTS 30 Day Income Plan. Full Instructions provided. NO HIGH SCHOOL DIPLOMA NECESSARY. This is a COMPLETE course which starts with basic subjects and gradually advances to Radio-TV. . . . ALL FOR A PRICE YOU CAN AFFORD!

*THE ONLY VERTICAL MULTI-CHASSIS 21" TV KIT OFFERED BY ANY RADIO-TV SCHOOL



YOU BUILD THESE AND OTHER UNITS!

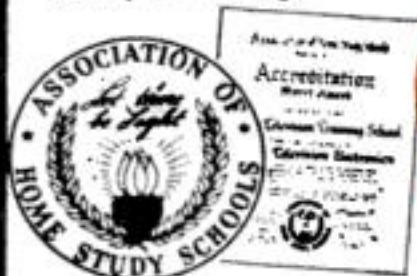


COMPLETE COLOR TV INSTRUCTION INCLUDED!

Each student is entitled to unlimited consultation service. All questions are answered promptly and completely by highly specialized instructors.

*Tubes Excluded

RTS' Membership in The Association of Home Study Schools is your assurance of Reliability, Integrity and Quality of Training.



RADIO-TELEVISION TRAINING SCHOOL
815 EAST ROSECRANS AVENUE
LOS ANGELES 59 CALIFORNIA

Est. 1922



RTS Will Train You at a Price You Can Afford and When You Are a Qualified Graduate Will Help You Open a Service Shop of Your Own and Supply You With Every Bit of Equipment You Need to Get Started - Plus an Inventory of Parts and Necessary Supplies.

ALL FINANCED WITHOUT INTEREST OR CARRYING CHARGES!!

You Also Receive . . . Advertising Help and Material, Shop Plans, Business Systems, Letterheads, Calling Cards and Much More!

Here's What Two of Many Business Plan Shop Owners Have to Say!

This business takes in between \$1500 and \$2000 a month. I've had to hire help to keep up with it.

CULLEN W. IRBY
Corpus Christi, Texas

The school lives up to its promises 100%. RTS does not lose interest in its students once they graduate.

HAROLD R. STANLAKE
Perry, Michigan

Rush Coupon for FREE FACTS!

DON'T LOSE OUT — FIND OUT!

RADIO TELEVISION TRAINING SCHOOL, Dept. PS-100
815 EAST ROSECRANS AVE LOS ANGELES 59 CALIF
Rush me full information by return mail. (Please Print)

NAME _____ AGE _____

STREET _____

CITY _____ ZONE _____ STATE _____

NO SALESMAN WILL CALL ON YOU!

PS Puzzlers continued

buy any more on Sunday."

A few spectators came up with ideas, none of which worked. Then Jim said, "Wait—give me five minutes and I think I can do it."

He went into the house. Five minutes later he was back with the ball all nice and round again. What had he done?

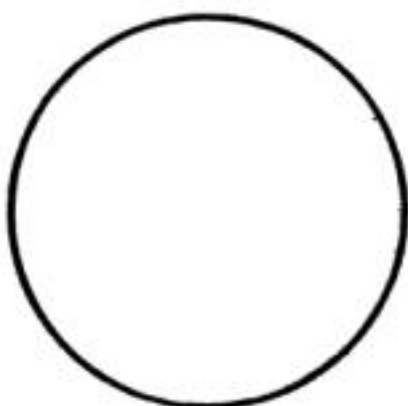
A LITTLE intuition is all you need to solve this "chess" problem:

A chessboard is an eight-by-eight square containing 64 alternating red and black squares. Suppose two of the squares are cut out: one from the upper left-hand corner, one from the lower right. Can you now take 31 dominoes, each of which is a two-by-one rectangle, and completely fill the slightly altered board?

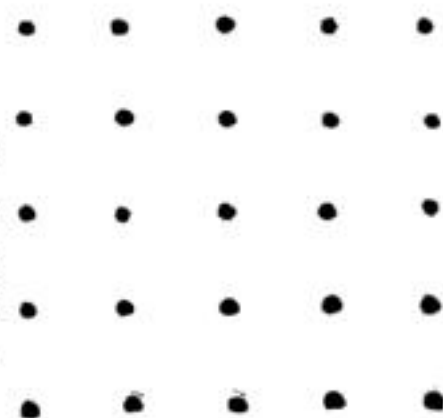
Hint: You don't need to use formulas nor even make a diagram to solve this one. A mental picture is all that you need.

HERE'S a pair of visual puzzles to play with—no equations, no complicated logic, just some pencil doodling:

How many pieces can you cut the circle into, using four straight lines?



Remove exactly 10 dots and leave three in each row, each column, and along the main diagonals.



Puzzle of the month



TALK about puzzles that defy common sense! Here's a dandy. Some information must be missing!

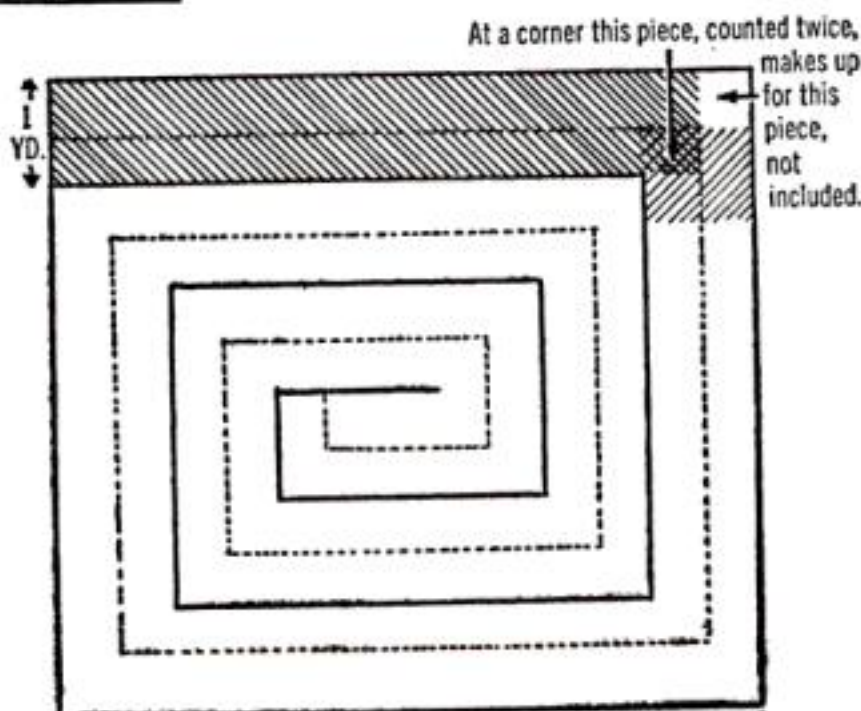
Our old friends A, B, and C were engaged in track-and-field events one fine fall day. They amassed points for first, second, and third places as follows:

- A: 22 points
- B: 9 points
- C: 9 points.

True to form, A was top scorer. B got first in javelin throwing. Who placed second in the 100-yard dash? (Answer next month.)

Answer to last month's P-O-T-M. What are the dimensions of an oblong garden half a yard longer than wide, consisting of a gravel walk spirally arranged a yard wide and two miles and half a furlong long?

The trick to this puzzle is to realize that as you walk down the center of the path you trace out the area of the garden. The path is one yard wide so for every yard you walk you cover one square yard of area. At the corners you still walk a yard to cover a square yard of corner. (See diagram.) Thus you need only solve the equation: $(x)(x + \frac{1}{2}) = 3,630$ (changing miles and furlongs to yards). Work this out and you get the dimensions —60 by 60½ yards.





At home with the Nelson Foxes ...shooting Crosman Pellguns!



JOIN THE
NATIONAL RIFLE
ASSOCIATION



"Crosman Pellguns mean *real* shooting fun my whole family can enjoy together," says baseball star Nellie Fox. CO₂ gas power gives you controlled range and power—makes shooting three times more fun. Shoot most anywhere, anytime, all year 'round—for less than a penny a shot... **WRITE** for free literature. Crosman Arms Co., Inc., Dept. PS-0210, Fairport, New York.

See them at your Crosman Select Dealer Sales Center

Crosman CO₂ GAS **HAHN**
PELLGUNS BB GUNS

WORLD'S LARGEST MANUFACTURERS OF CO₂ GAS-POWERED RIFLES AND PISTOLS

8 FT. SPECIALS — 80¢



They're really BIG! These GIANT 8 FOOTERS (new, genuine neoprene govt. surplus) are terrific.

*FUN

for young & old alike

- Parties
- Schoolproms
- Picnics
- Beach, etc.

Yours at a fraction of their original cost. Order several, they make wonderful gifts.

8' dia.—80¢ ea. 2 for \$1.50
13' dia.—\$1.95 ea. 15' dia.—\$2.95 ea.
20' dia.—\$4.95 ea. 25' dia.—\$5.95 ea.

Postage pd. on ppd. orders.
Cal. res. add sales tax.

FRANK SALES, Dept. PS1060, 3828 Sunset Blvd., Los Angeles 26, Calif.

*BUSINESS

Just paint a message on, inflate & fly

- Store Openings
- Gas Stations
- Fairs
- Trade Shows, Etc

The BIG opportunities are now in

AIR CONDITIONING AND REFRIGERATION

Want a better job, big pay and a secure future? Be a mechanic in Air Conditioning & Refrigeration—America's finest opportunity field! During the past 12 years, production increased 400%—no industry did better! Each year over 8 million domestic and commercial units are sold. Already 150 million are in use. The industry needs 20,000 newly-trained mechanics annually!

Train at home for a top-pay job or your own business. The CTI method is easy, practical and resultful. Learn by practicing with 25 kits of tools and parts. Earn money spare time. For full information, mail coupon today. Commercial Trades Institute (a non-profit organization), Chicago 26, Illinois.

You train
at home
with real
equipment

25 Kits!



FREE! 53 ORIENTALS



Send today for this Spectacular Oriental Collection! More than 50 fabulous genuine postage stamps from Taiwan, Korea, Viet Nam, Japan, Singapore, Burma, Pakistan, Indonesia, Thailand, Hong Kong, Laos, many other strange, remote lands of the mysterious Far East. Sensational stamps picturing weird beasts, birds, ancient ships, queens, kings, beautiful women. Extra! Big Bargain Catalog, exciting offers and other thrilling stamps for your free examination. Send 10c for mailing expense — Double your money back if not delighted!

Jamestown Stamp Co. Dept. C100PS, Jamestown, New York

COMMERCIAL TRADES INSTITUTE, Dept. R-780
1400 Greenleaf Avenue, Chicago 26, Ill.

Send booklet, *Success in Air Conditioning & Refrigeration*, and Lesson Samples. Both FREE.

Name _____ Age _____

Address _____

City _____ Zone _____ State _____

Accredited by National Home Study Council





Problem in wing tanks

This man is putting a finish on the fairings of a plastic wing-tip tank for a British Canberra jet bomber. Each of the paired tanks holds 250 Imperial gallons. Plastic fuel-drop tanks, pioneered in Britain, are said to be just as strong as metal ones, but easier to handle.



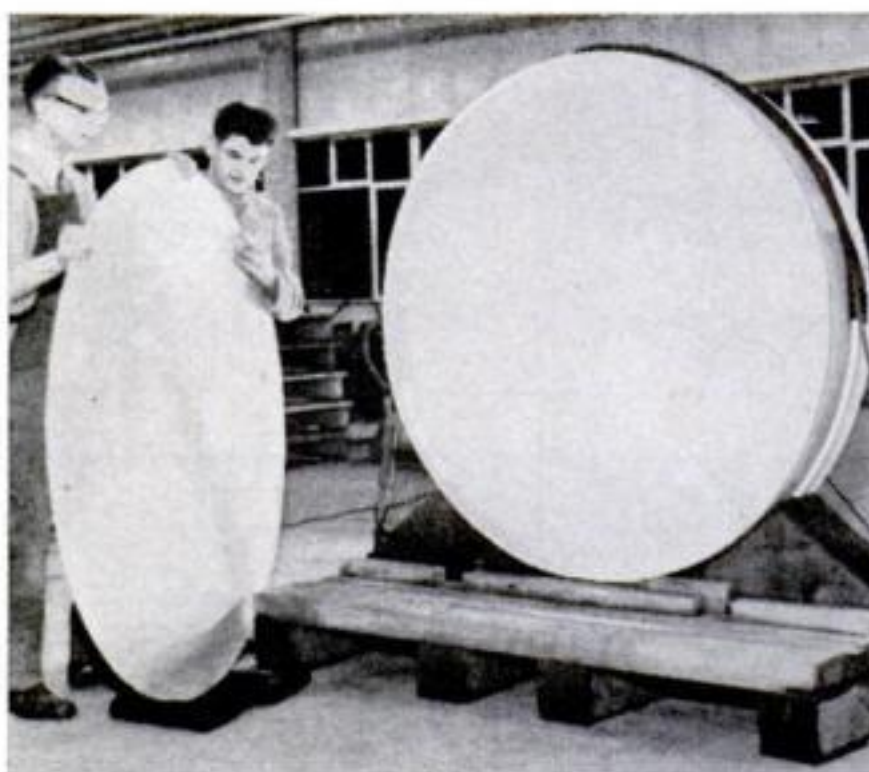
Automatic target recorder

Placed in a bunker beneath a target area, this Army device records scores automatically. As GIs blast away, solenoids on the targets transmit information to the recorder. It can service up to 20 targets at a time, penning accurate graphs of the day's shooting for later study.



Pedal-powered ponycarts

For a small fee, Roman children can hire a pedal-powered ponycart for a drive in the Borghese Gardens. Here an owner leads his stable of high-steppers across a cobbled street in Rome, heading for the park and a day's business.



Glass cut with bandsaw

The big disk at right, being packed for shipment in an English optical works, is 58 inches across, 12 inches thick. Its two faces were accurately cut with a bandsaw in four days. Grinding would have taken about three weeks.

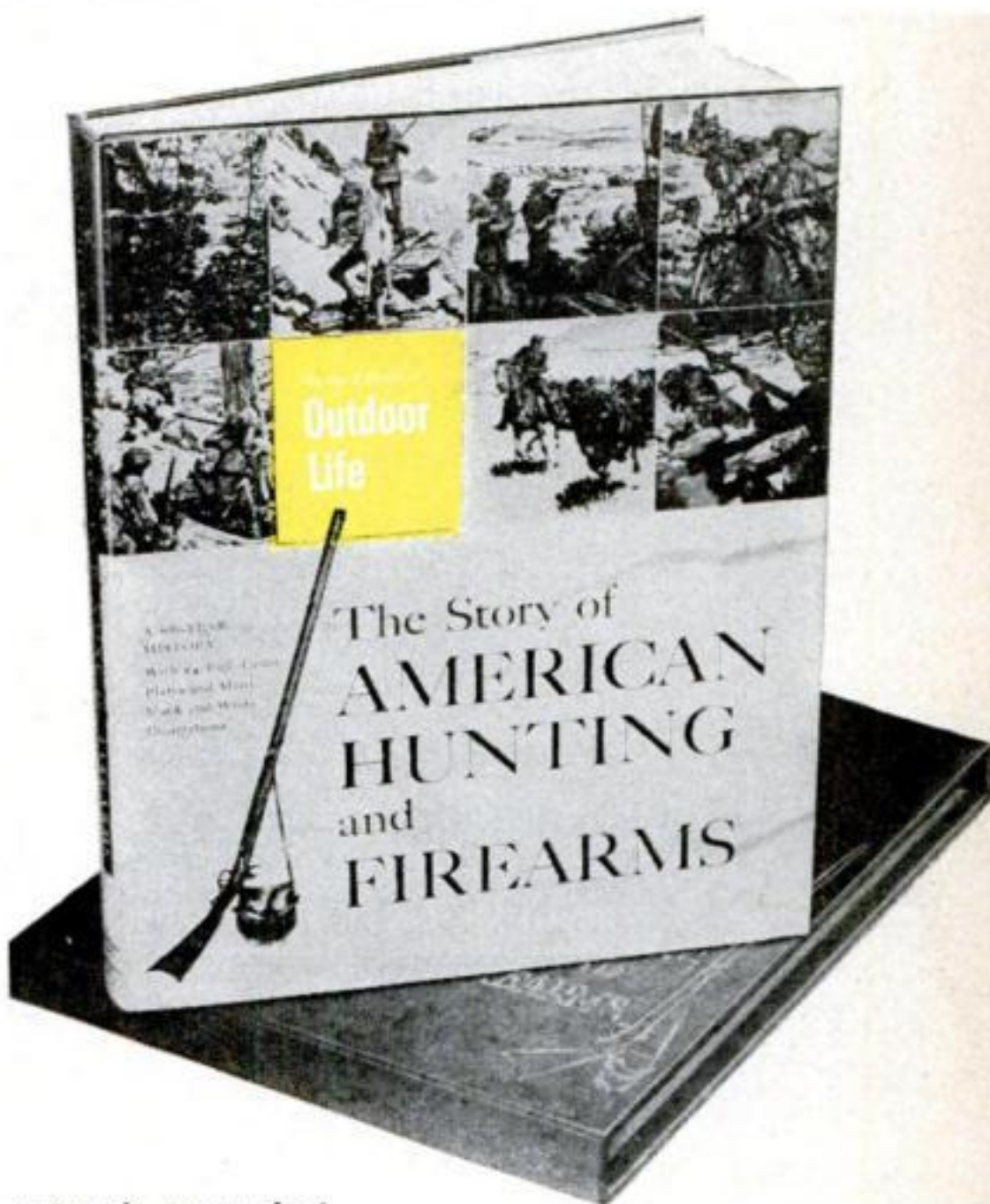
**Every Popular Science reader
who mails the coupon below
will receive this \$10⁰⁰ book**

FREE

YES, as a joining member of the Outdoor Life Book Club, you receive the splendid luxury volume, *The Story of American Hunting and Firearms*, entirely without cost! This magnificent new volume sweeps you through the lusty 400 years of hunting in the United States. It is crowded with dramatic adventures that take you from rugged pioneer days to modern times. It is loaded with fascinating facts on all types of firearms, from the antique harquebus to today's high-powered hunting arms.

The Story of American Hunting and Firearms is a giant-format book that opens to nearly two feet. It is written by the editors of Outdoor Life magazine and illustrated with superb full-color, full-page paintings by Ralph Crosby Smith. In addition, there are scores of illustrations and detail drawings by two outstanding field and gun artists, Ray Pioch and Nicholas Eggenhofer. Never before has such exciting material been so dramatically told, so gloriously illustrated in one outstanding luxury book.

Yes, *The Story of American Hunting and Firearms* is a stirring chronicle of Americana—a book you and your family will treasure for years to come. And this deluxe, \$10.00 volume, in its handsome matching library slipcase, is yours absolutely *free* as a joining member of the Outdoor Life Book Club.



Your first club selection is an exciting book on nature's mysteries!

Start your membership with **THE STRANGEST THINGS IN THE WORLD** which spreads before you a wealth of new and unusual information on animals, trees, fish, plants, birds and insects.

You'll be fascinated as you read about crocodiles with life after death . . . about

three-eyed lizards of New Zealand . . . about ants that use their children as sewing needles . . . about fish that fish for fish . . . and countless other amazing things in the world of nature.

THE STRANGEST THINGS IN THE WORLD sells for \$3.50 in bookstores; it is yours for only \$2.95 as a member.

*A home library
treasure!*

Measures 10½" x 13½"

*In matching
deluxe slipcase.*

Outdoor Life BOOK CLUB

355 LEXINGTON AVENUE, NEW YORK 17, N. Y.

Please enroll me in the Outdoor Life Book Club and send my bonus book, *The Story of American Hunting and Firearms* and my first monthly selection, *The Strangest Things in the World* (combined bookstore price, \$13.50). Bill me later for only \$2.95, plus postage, as payment in full. From the monthly advance descriptions I will receive, I need select only one additional book in the next 12 months. I need pay only Club members' special reduced price and you will include my free gift with each book I purchase.

NAME _____

ADDRESS _____

CITY _____ *ZONE _____ STATE _____

*Avoid post office delay. Include your zone number, if any.

Note to Canadian residents: Membership available in Canada at slightly higher prices. Please mail coupon to: Outdoor Life Book Club, 811 Chatham Street, Montreal 3, Quebec, Canada.

PS 1060

OLBC MEMBERSHIP BUILDS YOUR FAMILY LIBRARY!

After this first big two-book shipment, you'll be offered a book a month from today's best books on hunting, on world-wide exploration, on the marvels of nature, on new fishing techniques, on the animal kingdom—and you need accept only one more selection in the next 12 months to retain all membership benefits. You'll share in savings resulting from large Club printings by receiving big discounts on every book you accept.

EXTRA—with every future selection you purchase you'll receive a new and different *free surprise gift*—a practical item every member of your family will enjoy.

FREE! NEW CATALOG Big Savings... FAMOUS MAKES! ACCORDIONS



**BUY DIRECT... at
Importer-to-You Prices**
...save middlemen's profits!
5 DAY FREE TRIAL!

E-Z TERMS

Low as
\$9.95 Down
Balance...
Just Pennies
a Day

**Over 30
Standard
or Electronic
Models**
for Students
Teachers or
Professional
Musicians

TRADE-IN
Your Old Accordion
BIG ALLOWANCE!

SAVE UP TO 1/2
OFF RETAIL PRICES of
Comparable Accordions

WORLD'S LARGEST EXCLUSIVE ACCORDION DEALER saves you more than you ever hoped possible on new famous-make Italian Accordions of your dreams! Because you buy DIRECT... Importer-to-You... save up to 50% OFF retail prices of comparable accordions. Compare our low prices... see and judge for yourself. Rush coupon for FREE Color Catalogs and low Importer-to-You price list. See America's most exciting selection... **over 30 models**. Exclusive features! Full range of Colors! Newest styling! Get FREE 5-DAY PLAYING TRIAL IN YOUR HOME. If you decide to keep instrument, pay for it only pennies a day on E-Z terms. 100% Satisfaction Assured. Get FREE BONUS GIFTS for promptness... Free Home Study Course. Trade-in allowance.

FREE BONUS GIFTS

for promptness in ordering

- Year's Supply of Music
- Home Study Course
- Sturdy Music Stand
- Name in Chrome Letters
- Bellows Protector
- Music Portfolio

Let us prove how much more you save—thanks to our money saving Importer-to-You plan. You pay NO Teacher's or Salesman's commissions. We buy for less, save on high overhead... and pass these savings on to you. Mail coupon today for FREE Color Catalogs and Importer-to-You prices. No obligation.

ACCORDION CORPORATION OF AMERICA
Dept. P-100, 2003 West Chicago Ave., Chicago 22, Illinois

FREE

Color Catalogs
... Low Direct
Importer-to-You
Prices... Rush
Coupon Now!

Accordion Corporation of America, Dept. P-100
2003 W. Chicago Ave., Chicago 22, Ill.
Rush color catalog and "Importer-to-You" prices.

Name.....

Address.....

City & Zone..... State.....

☐ Check if you have instrument to trade in.

engineering degree in only 27 months

Realize your dream of becoming a graduate engineer. Then promotion will not pass you by. Share rewards awaiting college men... higher income... rapid advancement. Important firms visit Tri-State campus to interview seniors. Founded 1884. **Bachelor of Science Degree in 27 months** in Electrical Engineering (Electronics or Power major), Mechanical, Civil, Aeronautical, Chemical Engineering. **In 36 Months** a B.S. in Business Administration (General Business, Accounting, Motor Transport Management majors). For earnest, capable students. Small classes. More professional class hours. Well-equipped, new and modernized buildings, labs, dorms. **Modest costs.** Year-round operation. Enter Jan., Mar., July, Sept. Write **J. F. McCarthy, Director of Admissions**, for Catalog and Career Book.



TRI-STATE COLLEGE

5100 College Avenue • Angola, Indiana

SHORTHAND IN

Famous **SPEEDWRITING** shorthand. 120 words per minute. No symbols; no machines; uses ABC's. Learn at home or through classroom instruction. Low cost. 500,000 graduates. For business and Civil Service. Typing available. 38th Year. Schools in over 400 cities. Write for FREE booklet.

Speedwriting
Dept. 2610
55 W. 42 St., N.Y. 36, N.Y. 

6
WEEKS

"YOU ARE UNDER ARREST!"



Help Bring Crooks to Justice Through Scientific
CRIME DETECTION!

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you in your own home. Learn Fingerprinting, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I.A.S. students or graduates. Write for FREE "Blue Book of Crime." State Age.

(A Correspondence School Since 1916)
INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 1367, Chicago 40, Ill.



**Exciting Jobs—Big Pay... Operating
EARTH MOVING EQUIPMENT**

Men needed now for good paying jobs in booming road and construction work. Learn how to operate heavy road machinery, cranes, bulldozers, earth carriers, etc. Actual "on the job" training. 5 to 13 1/2 week courses. Classes start every Monday. Reserve your space now. Complete catalog and reservation facts FREE. Approved for veterans. Write

Greer TECHNICAL INSTITUTE
Attn: S.L. Hutch, Box 368, Braidwood, Ill.

ELECTRONICS

Train in the new shop-labs of the world famous
COYNE ELECTRICAL SCHOOL on a quarter of a million dollars worth of equipment or learn at home in your spare time with Coyne's modern television training.

Use this coupon to get our free book
"GUIDE TO CAREERS"

COYNE ELECTRICAL SCHOOL
1501 W. Congress Pkwy.
Chicago 7, Ill., Dept. of Electronics

☐ training
at Coyne

☐ training
at home

NAME.....

ADDRESS.....

CITY.....

STATE.....

Unlike most other schools, we do not employ salesmen.



New from Wolverine!
**WORLD'S
 LIGHTEST
 SERVICE SHOES**

Most comfortable ever! Weigh a pound less than ordinary work shoes. Their exceptional lightness is so easy on the feet. Uppers are flexible elk-tanned leather . . . soles are springy, oil-resistant, neoprene cushion crepe, nearly three-quarters of an inch thick. Steel shanks, of course. And smart sports styling plus handsome Burgundy color add good looks to the comfort.

WOLVERINE
 ROCKFORD, MICHIGAN

Service Oxfords
 Boots

Work Shoes
 Safety Shoes

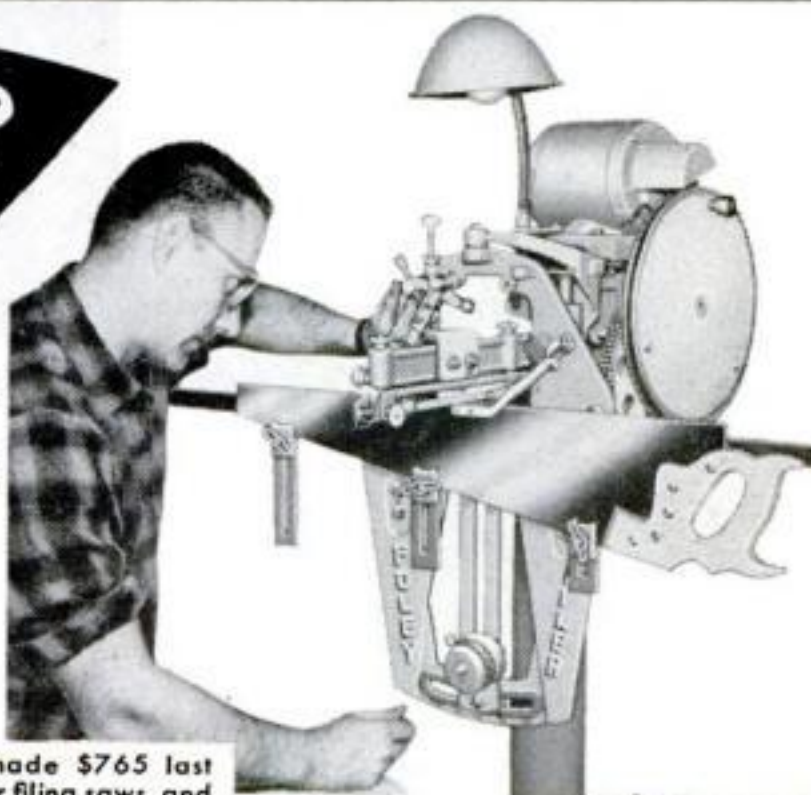
**HERE'S A MONEYMAKER
 FOR YOU!**

**make from \$3 to \$6 an hour
 with the FOLEY SAW FILER**

Ask yourself these three questions: 1. Do I really want to get ahead *faster*? 2. How can I do it? 3. Am I willing to *use* my spare time? If you answer "Yes" to questions 1 and 3—then we have a positive answer for you on No. 2. Men make from \$3 to \$6 an hour sharpening hand, band and circular saws with Foley Saw Filers. No experience needed, to turn out sharp, smooth-cutting saws with this automatic machine. Start in spare time—no canvassing.

HERE'S THE WAY TO START

Read "Money Making Facts"—shows you how others have added hundreds or thousands of dollars to their incomes in this steady, repeat, CASH business. Start your *own* business in your basement or garage, no overhead, small investment. With *Time Payment Plan* the Foley can more than pay for itself out of profits. Send for "Money Making Facts"—mail coupon now. No salesman will call.



HERE'S PROOF

"When Mr. Patrick got his Foley Saw Filer in March 1946 he made a good and wonderful investment. He has done so well that we bought a house and paid for it; bought a new car, built an addition to our house. Nicest of all, it's all paid for." Mrs. Leslie Patrick.

"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time." —James B. Williams

"Last year's profit amounted to \$3,000. Not so bad for a one-man outfit." —Charles C. Hough.

"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back with repeat orders." —Len Crego.



FOLEY MFG. CO., 1019-O Foley Bldg., Minneapolis 18, Minn.

Send me free book "MONEY MAKING FACTS" and Time Payment Plan.

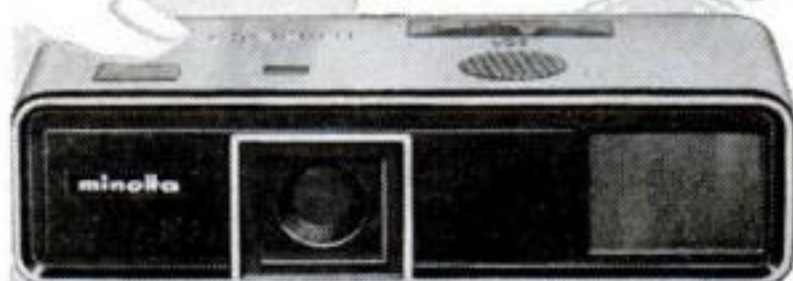
NAME _____

ADDRESS _____

New
Pocket
Camera

MINOLTA-16P

"WEATHER DIAL"
sets exposure automatically



\$24.95

No figuring, no focusing. Set the "weather dial" and shoot. It's that easy. You get brilliant color slides or jumbo 3x4 pictures. Fully synchronized for flash pictures. And the precision Rokkor f:3.5 lens is fast enough to take many indoor pictures without flash.

MINOLTA CAMERAS
150 Broadway • New York 38, N. Y.

LEARN TO FIX APPLIANCES

Tremendous jump in electrical appliances and devices has increased need for service-men. Good money-making opportunities for young and older men. Benefit soon these five ways: (1) fix appliances after hours, weekends; (2) have full time service shop; (3) fill job openings being advertised; (4) go into sales and service business; (5) save, fix own appliances. Modern training program. Beginners learn in spare time at home. Professional Tester Kit furnished. Low cost, monthly terms. Information free. Mail coupon.

NATIONAL RADIO INSTITUTE
WASHINGTON 16, D.C.

BKO

Name.....
Address.....
City.....Zone.....State.....

Draw CARTOONS



...for a wonderful pastime or excellent earnings. Master cartooning at home in a few short weeks without waste of time or effort through the Famous System of Manual Training. Send for Big, Illustrated FREE Catalog!

CONTINENTAL SCHOOLS, INC., Dept. B-10
4201 South Broadway, Los Angeles 37, California



Play Right Away!

ANY INSTRUMENT

Now it's EASY to learn ANY INSTRUMENT—even if you don't know a single note now. No boring exercises. You play delightful pieces RIGHT AWAY—from very first lesson! Properly—by note. Simple as A-B-C. You can make amazing progress—at home, in spare time without teacher. Only few cents per lesson. 1,000,000 students, including Lawrence Welk. (Est. 1898—Licensed by N.Y. State Education Dept.)

FREE BOOK Shows how easily you can learn music. Write for it. No obligation, no salesman will call. **U. S. SCHOOL OF MUSIC**, Studio 1510, Port Washington, New York.

Now You Can
Learn Music In
Your Own Home

RUPTURED

BE FREE FROM TRUSS SLAVERY

Surely you want to THROW AWAY TRUSSES FOREVER, be rid of Rupture Worries. Then Why Do you put up with wearing a griping, chafing and unsanitary truss the balance of your life? If you do, it will NOT be through necessity but through choice on your part.

Now there is a new modern Non-Surgical treatment that is designed to permanently correct rupture. These Non-Surgical treatments are so certain, that a Lifetime Certificate of Assurance is given. Write today for our New FREE Book that gives facts that may save you painful, expensive surgery. Tells how non-surgically you may again work, live, play, love and enjoy life in the manner you desire. There is no obligation.

Excelsior Medical Clinic, Dept. H6224, Excelsior Springs, Mo.

NEW TRUE LAPSTRAKE KIT FREE CATALOG

MASS PRODUCTION PRICE Only \$205 World's largest kit builder—cruisers, runabouts, fishing boats.

EASY TERMS Freight Incl.

TAFT MARINE WOODCRAFT

Dept. PS-1060 636-39th Ave. N.E., Minneapolis, Minn.

make your own Gems 36.50 FOB

The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only \$36.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

B&I MANUFACTURING CO.
Dept. S, Burlington, Wis.

BEST QUALITY—GOODYEAR, FIRESTONE, Goodrich, U.S. and other carefully selected better used passenger tires. Better Values!

Golden Rule—Double

MONEY BACK GUARANTEE

12 Mos. FREE replacement or money refunded on any unsatisfactory tire returned within 6 Mos., frt. excl.

Heavy Duty Guar. Truck Tires—Premium Quality

600-16 (6)	\$7.55	700-15	8.95	700-20	\$10.95	1000-20	\$18.95
650-16 (6)	7.95	700-17	10.95	750-20	11.95	1100-20	18.95
700-16 (6)	8.95	700-17	11.95	825-20	17.95	1000-22	18.95
				900-20	17.95	1100-22	19.95

SNOW TIRES Retreated and slightly used **\$7.45** any car size

MARV BLATT Philadelphia, Pa.
605 Spring Garden,

ANY SIZE NOW

\$6.25 each any make White-walls 85c extra

Mr. Blatt says: "Let my 44 years in the tire business prove to you under guarantee my first line 'near new' tires are better & cost less than cheap new tires!"

Write for low prices on new & used farm tractor & foreign car tires. Send check or M.O. for rush shipment. All tires shipped FOB Phila.

Law!

STUDY AT HOME

We guide you step by step—furnish all text material, including 14-volume Law Library. Training prepared by leading law professors and given by members of the bar. Degree of LL.B. Low cost, easy terms. Send for valuable Free Book, "Law Training for Leadership," today.

LaSalle Extension University,
A Correspondence Institution

Dept. 1083L
Chicago 5, Ill.

Perpetual Motion Machine

Up to 2000 revolutions per minute! No Electricity. No Fuel. **RUNS FOREVER** until parts wear out. Even runs under water! Same principle as solar batteries used in space flights.

World's Most Fascinating Motor New Solar Engine

Baffles most people. What makes it run? Operates wherever there is light. The brighter the light, the faster it runs. Many entertaining uses & experiments. Money back guarantee: it must delight, amaze & amuse you & your friends. 2 for \$3.75. 3 for \$5.35. **\$1.98 Each Postpaid**

Johnson Smith Co., Dept. 917, Detroit 7, Mich.

NO JOB WORRIES

PLASTEX INDUSTRY needs manufacturers on small scale for big production of Lamps, Clock Stands, Art Goods, Novelties in Plastic Marble Imitation. No Experience necessary. $\frac{1}{2}$ c material makes regular 10c store sellers. Moulds furnished for fast production. Small investment brings good profit. Big wholesale orders now being placed. Ambitious men have chance for real prosperity and job security. Our NEW FREE booklet will interest and benefit you.

PLASTEX INDUSTRIES, Dept. 2, 3400 Third Ave., New York 56, N. Y.

ENGINEERING SCIENCE MATH

DEGREE IN
27 or 36 MOS.

ACCELERATED YEAR-ROUND PROGRAM prepares for early employment in fields of SCIENCE AND ENGINEERING. Regular 4-year program for B.S. Degree completed in 36 months, special engineering degree program in 27. Classes start December, March, June, July, September. QUALITY EDUCATION. Graduates employed from coast to coast. Government approved for veteran training. Students from 50 states, 40 countries. 20 buildings; dorms, gym, Campus. SAVE TIME AND MONEY. EARN BOARD while studying. Write for catalog and complete information.

INDIANA TECHNICAL COLLEGE

6100 E. Washington Boulevard, Fort Wayne 2, Indiana
Please send me free information on Bachelor's Degree Programs in Engineering and Science as checked below:

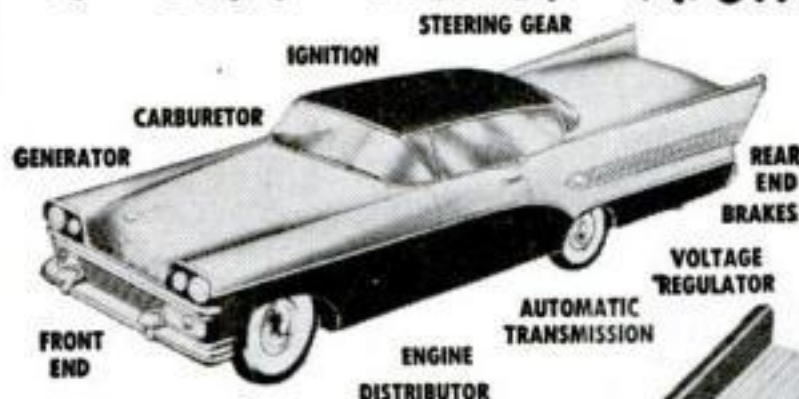
- | | |
|---|--|
| <input type="checkbox"/> Aeronautical Engineering | <input type="checkbox"/> Mechanical Engineering |
| <input type="checkbox"/> Chemical Engineering | <input type="checkbox"/> Metallurgical Engineering |
| <input type="checkbox"/> Civil Engineering | <input type="checkbox"/> Physics |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Chemistry |
| <input type="checkbox"/> Electronic Engineering | <input type="checkbox"/> Mathematics |

Name _____

Address _____

HOW TO FIX ANY PART OF ANY CAR

QUICKLY--EASILY--RIGHT!



FREE 7-DAY TRIAL

Whether you're a beginner or an expert mechanic—now you can "breeze through" any "fix-it" job from simple carburetor adjustment to complete overhaul. Just look up job in index of MOTOR'S Brand-New Auto Repair Manual. Follow simple step-by-step directions, clear pictures. Presto—the job is done!

No guesswork! MOTOR'S MANUAL takes you from "scratch" — shows WHERE to start, WHAT tools to use. Covers EVERY job on EVERY car listed — from 1953 thru 1960!

Everything You Need to Know "Boiled Down" from 176 Official Shop Manuals

BIG NEW, REVISED, ENLARGED Edition contains the "meat" from 176 OFFICIAL shop manuals — simplified for YOU. 23,436 essential repair specifications on 25 different makes. Over 1,000 big pages. More than 2,800 "this-is-how" pictures. 225,000 service and repair facts. Leads beginners every step of the way. Time-saving factory repair procedures for experts. Instructions and pictures so clear you CAN'T go wrong. Used by U. S. Army and Navy.

Try Book FREE 7 Days

Just mail coupon. (Attach it to postcard if you wish.) Make Manual prove what it's got. Unless you agree this is the greatest time and work saver you've ever seen—return book in 7 days, pay nothing. Mail coupon today to: MOTOR Book Dept., Desk 020, 250 West 55th Street, New York 19, New York.

Same FREE Offer On MOTOR'S New Truck Repair Manual

Covers EVERY job on EVERY popular make gasoline and Diesel truck made since 1952. FREE 7-Day Trial. Check proper box in coupon.

Covers ALL Models — 1953 thru 1960

Buick	Hudson
Cadillac	Imperial
Chevrolet	Jeep
Chrysler	Lincoln
Continental	Mercury
Corvair	Nash
Corvette	Oldsmobile
Dart	Plymouth
De Soto	Pontiac
Dodge	Rambler
Edsel	Studebaker
Falcon	Thunderbird
Ford	Valiant

MAIL COUPON NOW FOR 7-DAY FREE TRIAL (Attach to Postcard if More Convenient)

MOTOR BOOK DEPT.

Desk 020, 250 W. 55th St., New York 19, N. Y.

Rush to me at once (check box opposite book you want):

- ☐ MOTOR'S New AUTO REPAIR MANUAL. If O.K., I will remit \$2 in 7 days, \$2 monthly for 2 months and a final payment of \$1.95 (plus 45c delivery charges) one month after that. Otherwise I will return the book postpaid in 7 days. (Foreign price, remit \$10 cash with order.)
- ☐ MOTOR'S New TRUCK REPAIR MANUAL. If O.K., I will remit \$3 in 7 days, and \$2 monthly for 3 months, plus 45c delivery charges with final payment. Otherwise I will return book postpaid in 7 days. (Foreign price, remit \$11 cash with order.)

Print Name.....Age.....

Address.....

City.....Zone.....State.....

☐ Check box and save 45c delivery charge by enclosing WITH coupon payment of \$7.95 for Auto Manual (or \$9 for Truck Manual) plus sales tax. Same return-refund privilege.

New TEACH-YOURSELF COURSE IN Silver Brazing

FOR SUPERIOR METAL JOINING

• RAPID • EASY • LOW-COST

NOW YOU CAN BECOME A trained Silver Brazier. Silver brazing is the most versatile maintenance and repair tool. It is essential in making mock-ups and prototypes.

New Teach-Yourself Course (from the world's leading silver brazing authority) quickly gives you the know-how of an expert brazer. You learn rapidly, at home or in your plant, in spare time. Low cost. No previous experience needed.

HOBBYISTS!

Now do fast, flawless metal-joining work on jewelry, guns, models, antiques, house repairs, tool repairs, etc. anything! Learn silver brazing in double-quick time.

Recommended by Companies Themselves

More and more companies are silver brazing because it has so many advantages over other metal-joining methods—for strength, leak tightness, corrosion resistance, etc., etc. Opportunities are continually opening up. Through this Course (recommended by the companies themselves) you will be in step with this trend. You get the same expert training which 50,000 men and women have already received in in-plant classes. You get all the materials needed to practice the actual brazing operations you'll do in your job.

FREE Information

Mail coupon below for complete FREE information about this fast new Teach-Yourself Course . . . how it can help you . . . names of large manufacturers who switched to silver brazing. No obligation. No salesman will call. Just mail coupon. Or write to: **HANDY & HARMAN, Dept. 210, 82 Fulton St., New York 38, N. Y. (Established 1867)**

SILVER BRAZING GROWING RAPIDLY IN SUCH BOOMING INDUSTRIES AS:

Aeronautics, rockets & missiles, autos, shipbuilding, electronics, business machines, appliances, etc.

GET ALL THE FACTS FREE

HANDY & HARMAN, Dept. 210, 82 Fulton St., New York 38, N. Y.

I want to learn silver brazing. Please send me the FREE facts about your new Teach-Yourself Course in Silver Brazing and its wide uses. I understand this does not obligate me in any way, and no salesman will call on me.

My present job is

Name Age
Please Print Clearly

Address
Zone No.

City (if any) State



You can make money in

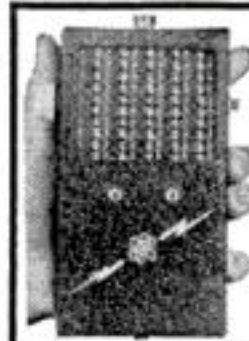
WATCH REPAIR

Learn at home the low cost Sweazey Way

Watch repairing pays up to \$6 an hour, part time watch makers report on survey. Unique and modern Sweazey home study System starts you making repairs right away on Swiss and American watches. Professionally prepared training. No previous experience needed. Special tools provided for practice. Tuition only \$5 a month. Diploma Awarded. Free sample lesson and opportunity book give all facts. Write today. No obligation.

CHICAGO SCHOOL OF WATCHMAKING

2330 N. Milwaukee Avenue, Dept. 4100, Chicago 47, Illinois



AMAZING MINIATURE TRANSMITTER

Broadcast on to any radio or car radio. Use as fun maker, P.A., Walkie Talkie, Portable (5 3/4 x 3 1/2 x 1 3/4) with self contained batteries and antenna. No wires or hookups! Works up to one block or more. No license needed. Transmits through walls! Simply push button to talk. Built-in selector lets you tune station desired. 3 Models: M27-\$10.95, Hi-power M37-\$11.95, Super Power de lux M47-\$12.95 post paid or send \$1.00 and pay postman balance. Batteries \$2.50 extra. Kits all models, \$2.00 less than above. Write for free info.

HALCO ELECTRONICS, DEPT. K
9211 Venice Blvd., L. A. 34, Calif.

DAN LURIE
AMERICA'S
CHAMPION
MUSCLE
BUILDER



Send
10c
For
Catalog

BUILD YOUR MUSCLES FAST WITH DAN LURIE BARBELLS

Get results as no other method can. See as low as your arms, chest, legs grow like magic. No other method compares. Get \$10.00 BODY MOLD COURSE FREE with order. Results guaranteed. Buy direct and save.

50 lb. set ... \$9.48 • 150 lb. set ... \$23.48
100 lb. set ... \$15.98 • 200 lb. set ... \$29.98

Semi-steel sets approx. 10% higher. Extra wts. 15c per lb. Send 50% cash bal., COD., F.O.B. Plant. Order today.

DAN LURIE BARBELL CO., 1661 Utica Ave., Dept. 70-K, Bklyn. 34, N. Y.



Learn YOGA Secrets

Have better health, reserve vitality, and a sharp, keen mind . . . from YOGA, the science of body and mind control.

New POWER for Success! Spend a few minutes a day on this fascinating study to gain new energy, will power, confidence . . . whatever your age. Test this great life-science yourself . . . FREE Trial Lesson I, no obligation!

INSIGHT SCHOOL Dept. 900, 845 Chicago Ave., Evanston, Ill.

RUPTURED?

TEST THIS TRUSS FREE FOR 30 DAYS



Wear a Web for strong support and lasting relief of reducible inguinal rupture. If not satisfied after 30-day trial, purchase price refunded in full. Write now for free book on rupture care.

WEB TRUSS Co. Dept. PS-10, Hagerstown, Md.

INVENTIONS WANTED! FREE PATENTS!

Get full information on **SHAW'S PATENT PROMOTION PACKAGE** . . . Your invention fully protected while we run down patent, manufacture, merchandising, sales . . . **YOU RAKE IN PROFITS** . . . small registration fee covers everything! Write today

SHAW ENTERPRISES
—Inventors' Agents—

Dept. PS-10, 908 N.W. 79th St., Miami 50, Florida
Plaza 8-2645

Member, Miami-Dade County Chamber of Commerce

make \$10 an hour—

\$300 a week

HELP US

SUPPLY THE OVERWHELMING DEMAND
FOR OUR NEW, REVOLUTIONARY

sunmaster "Multi Million-Prism"

5 YEAR BULBS

Wonderfully soft, flattering,
eye-comfort light uncondi-
tionally guaranteed for 5
years. (Outlasts 13 ordinary
bulbs). Unlimited earning
possibilities! **ONE-TIME-
ONLY OFFER** — Send \$1.98
for six sample bulbs worth
\$4.69. Sell them or return for
full refund.

Silicate-
treated to
assure positive
overall light
for 5 years

Write for free Dynamic Sales Kit.

SUNMASTER ELECTRIC PRODUCTS, INC.

Dept. PS 10, 366 Fifth Ave., New York 1, N. Y.

In Canada: Dept. PS 10, 539 King Street West, Toronto, Ont.,

If you take

Color Pix

8mm - 16mm - 35mm 127 • 120 • 620

You must get our **MONEY SAVING**

Free Catalog

Listing all popular KODAK and ANSCO Film
Type and Sizes . . . **WRITE TODAY!**

SOLAR CINE PRODUCTS, Inc.

"Direct-by-Mail" Film and
Processing Specialists for almost a quarter century" Dept. PSM
4247 S. Kedzie • Chicago 32,

75 POWER TELESCOPE \$3.98

New 3 in one telescopes, 3 variable 25X-
45X-75X magnification. Brass bound.
25 power for ultra bright images
45 & 75 power for long range.
Guaranteed to bring distant
stars, moons, ob-
jects, sports 75
times closer.



Most

powerful scope

sold anywhere near

this amazing low price.

American made, 5 sections. Opens

36" closes 1 ft; contains 4 ground &

polished lenses. Can also be used as powerful

compound microscopes. Directions included. Mass

production enables us to offer telescope complete at \$3.98

postpaid. Money back guarantee. Get yours now!

CRITERION CO., Dept. PSB-88, 331 Church St., Hartford, Conn.

POWERFUL NEW INVENTION, ONLY 2" LONG

SHOOTS THRU 100

PAGES-THIS BOOK!

'B-B SHOT'



MAKE THIS TEST... Load your

'BB Shot' and fire against this magazine. Notice that it drives
BB's through more than 100 pages. Though only 2" long x 1"
in diameter, this pocket-size device has amazing power and
accuracy. Use it for targets, pests and hunting. Scientifically
designed for high power, operating ease and safety.

FREE! Get the 'BB Shot' now — we'll include an extra
Velocity Cone and FREE Target, BB's and Auto-
matic BB Dispenser . . . all for only \$1.98 ppd. Money Back
Guarantee. Not sold to N. Y. C. residents or minors.

GRAYSON CO. • Dept. B-20, 210 Fifth Ave., N. Y. C. 10

**MONEY-BACK
GUARANTEE**

Name.....
Address.....
City..... State.....

\$1.98
ppd.

FREE

**CAREER
BOOKLET**



To guide you to a
successful future in

ELECTRONICS

RADIO-TV

COMPUTERS

ELECTRICAL

ENGINEERING

This interesting pictorial booklet tells you
how you can prepare for a dynamic career
as an Electrical Engineer or Engineering
Technician in many exciting, growing
fields:

MISSILES • AVIONICS • AUTOMATION

SALES • DEVELOPMENT

ELECTRICAL POWER • ROCKETRY

RADAR • RESEARCH

Get all the facts about job opportunities,
length of study, courses offered, degrees
you can earn, scholarships, part-time work
— as well as pictures of the Milwaukee
School of Engineering's educational and
recreational facilities. No obligation — it's
yours free.

MILWAUKEE

SCHOOL OF ENGINEERING

MAIL COUPON TODAY!

Milwaukee School of Engineering

Dept. PS-1060, 1025 N. Milwaukee St., Milwaukee, Wis.

Please send FREE "Your Career" booklet

I'm interested in

☐ Electronics ☐ Radio-TV ☐ Computers
☐ Electrical Engineering ☐ Mechanical Engineering

Name..... Age.....

PLEASE PRINT

Address.....

City..... Zone..... State.....

☐ I'm eligible for veterans education benefits.

Discharge date.....

FIND OUT BEFORE YOU BUILD OR BUY WITH POPULAR SCIENCE Hi-Fi test records

EACH RECORD SERVES ITS OWN PURPOSE...

"Testing with Sine Wave Frequencies," uses electronically produced tones to analyze each component in your hi-fi set.

"The True Sounds of Musical Tones," consists entirely of life-like tones of the actual instruments of a symphony orchestra — employed in a unique way to let you hear how your set gives out with real music.

AVOID DISAPPOINTMENT WHEN YOU BUILD OR BUY NEW EQUIPMENT

Tune speaker enclosures just right — by ear.

Discover how quiet or noisy a turntable is.

Show up worn stylus or poor tone arm.

Test the setting of equalization controls.

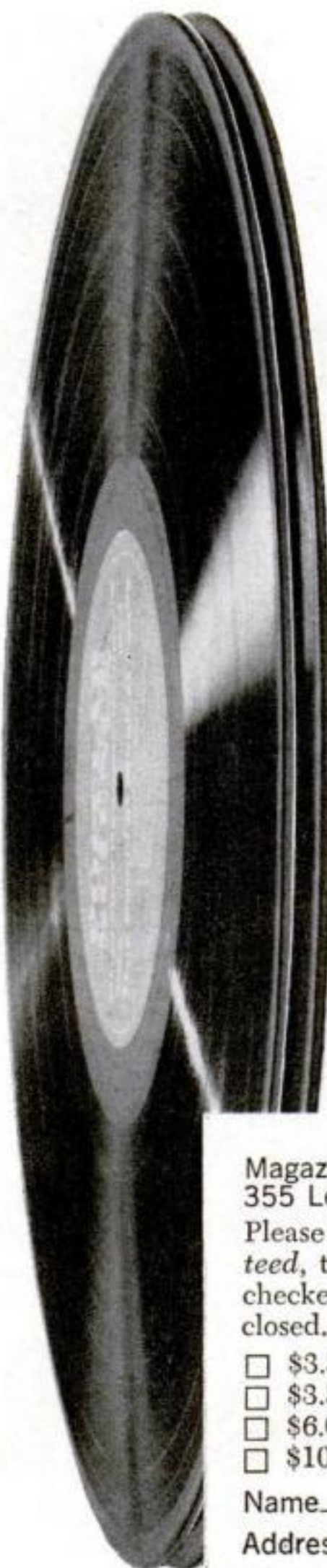
Challenges you to name common sound effects.

Check transient response and dynamic range.

Explore the personality of orchestral instruments.

Test bass response with actual music.

Shows how the high frequencies give realism to music.



VOL 1 • VOL 2

\$3.50
List Price
\$3.98 each

\$6.00
Price For
Both Volumes

YOU MAY WANT TWO OF EACH! SPECIAL DISCOUNT ON SECOND SET! TWO SETS COST YOU ONLY \$10.00

Extra Hi-Fi Test Records make unusual and welcome gifts or you may want to keep them, unplayed, as a reference standard to check the ones you use regularly.

The records come to you in protective dust sleeves and enclosed in attractive albums. Complete instructions for using the records are printed on the back liner of the albums.

Magazine Services, Inc. Department R-1060
355 Lexington Avenue, New York 17, N. Y.

Please send me, *postage free*, and *fully guaranteed*, the Popular Science Hi-Fi Test Records checked below. Check or money order is enclosed.

- ☐ \$3.50 for Vol. 1
- ☐ \$3.50 for Vol. 2
- ☐ \$6.00 for both Vol. 1 and 2
- ☐ \$10.00 for 2 sets Vol. 1 and 2

Name _____

Address _____

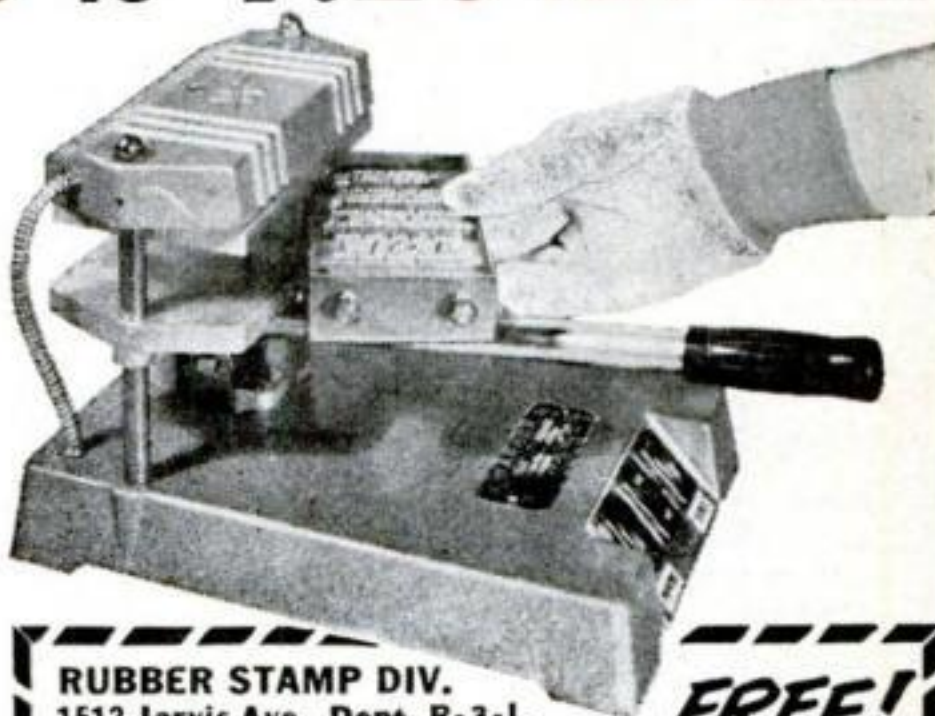
City, Zone & State _____

NEW RUBBER STAMP BUSINESS PAYS BEGINNERS ^{UP} ~~TO~~ \$9.20 AN HR.

**START AT HOME
IN SPARE TIME**
with Table Top Machine!

The multi-million dollar Rubber Stamp business—once controlled by a few big companies—is now being taken over by small operators—one in each community throughout the United States. Men and Women who have this inexpensive machine can turn out huge quantities of Rubber Stamps with special wording that buyers once were forced to buy from big cities. Material costing only 27c makes a stamp that sells for \$1.80. The machine that does the work is simple and easy to operate and it turns out as many as six Rubber Stamps at a time, each with different wording such as names, addresses, notices, stock numbers, prices and other "copy" needed by offices, factories and individuals. Working full capacity, it can earn as much as \$9.20 an hour for the operator! Now you can get into the big-pay business yourself, with your own home as headquarters. You don't need experience. We supply everything, including complete instructions and eight ways to get business coming in fast. Start making up to \$9.20 an hour from the very beginning. Cash in on the profitable Rubber Stamp business in your community, right away. We'll mail full particulars FREE and no salesman will call. Be first in your locality. Rush coupon today or send your name on postcard to

RUBBER STAMP DIV., Dept. R-3-L
1512 JARVIS AVENUE • CHICAGO 26, ILLINOIS



RUBBER STAMP DIV.
1512 Jarvis Ave., Dept. R-3-L
Chicago 26, Illinois

FREE!

Please rush full particulars about the little machine that can get me started in the profitable Rubber Stamp business at home in spare time. Everything you send me is FREE and no salesman will call.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

**FIGHT
HEART
DISEASE**

Give to your
HEART FUND

ENGINEERING



U.S. AIR FORCE Photo. Missile headed for outer space. Courtesy of Space Technology Laboratories, Inc.

Enroll Now for New Term
Heald College Ranks FIRST
West of the Mississippi in
"Who's Who in America"
Send for FREE information

Select any one of the 15 Modern Engineering Courses listed below. Any one of them will lead you to a Successful, Safe, and Secure Life-time Career.

BACHELOR OF SCIENCE DEGREE, 30 MONTHS

SAVE 2 YEARS' TIME

B.S. Degree Courses:

- ☐ Electronic Engineering
- ☐ Electrical Engineering
- ☐ Highway Engineering
- ☐ Mechanical Engineering
- ☐ Structural Engineering
- ☐ Civil Engineering
- ☐ Architecture

Diploma Courses:

- ☐ RADIO-TELEVISION
Plus Color TECHNICIAN
- ☐ Electronic Technician
- ☐ Industrial Electronic Tech.
- ☐ Die and Tool Design
- ☐ Architectural Drafting
- ☐ Mechanical Drafting
- ☐ Structural Drafting

Approved for Veterans

HEALD Engineering College

Van Ness at Post, Dept. PS-1060

San Francisco, California

NAME _____
STREET _____
CITY _____
STATE _____

Not everyone does as well, but T. N. CODY, who started a business of his own, reports...

For 12 months I've averaged

\$800
per month income

— most of it clear profit for me!

Many men have discovered how to be independent, to be free of layoffs and bosses. C. G. Naples grossed more than \$200 his first week. A father-son combination grossed \$44,000 their second year. H. Lemon says, "I netted \$133 in one 8-hour day."

How much you make depends largely on you. You need no special skill, no large investment. Start part time if you wish.

NO SHOP NECESSARY • Our Electric Deterger shampoos rugs, carpets right on floor—removes dirt and grime and helps to show their natural color and beauty. So efficient and safe it is used by largest railroads and hotels.

This is not a lease proposition. You own the machine, you work when and where you please and all the money you take in is your own. No risk. Machines fully guaranteed.

Mail
Coupon
Today
for
FREE
Book

VON SCHRADER MFG. CO.,
N11 "R" Pl., Racine, Wis.
Without obligation send me **FREE** booklet about your RUG DETERGER and tell me how I can start my own permanent, profitable business.

Name _____
Address _____
City _____ Zone _____ State _____



C-10

**Beauty by
Colorcrete
Can Earn
High Incomes**



Beautifying buildings by Colorcrete is a business opportunity awaiting men of modest capital everywhere. Owners of homes, stores, motels, schools — almost any type of construction—are looking for means to give lifetime eye-appeal to drab or dirty concrete, stucco and similar masonry surfaces. Colorcretors can do such jobs, in little time and at little cost, and pocket generous profits. Colorcrete is a cementitious material, applied by air pressure. Tough, tenacious, enduring; 30 colors. Investigate this low-investment enterprise by writing for the Opportunity Book.

COLORCRETE INDUSTRIES, INC.
572 Ottawa Ave., Holland Mich.

COLORCRETE

**HOME
IMPORT
BUSINESS**

Transistor
Radio with
battery
\$3.02



17-Jewel
Watch \$2.87



Derringer
Pistol \$5.74



Tape
Recorder
with Mike \$13.50

**MEN... WOMEN... MAKE
BIG PROFITS...** Buy dazzling bargains abroad. Sell to friends, stores or mail order. New Drop Ship Plan puts you in *direct* contact with overseas sources—starts you full or spare time, without product investment or previous experience. Complete details **FREE**. Write today!

MELLINGER CO., Dept. C 24A
1717 Westwood, Los Angeles 24, Calif.

... Plan shows where you get bargains like these for big profit sales.
DO NOT ORDER FROM US

LEARN WHILE YOU SLEEP!



Experiment in this fascinating, educational new field. Use your phono, recorder or amazing new "Electronic Educator" endless tape recorder. Free catalog lists over 200 unusual tapes, records, equipment for sleep-learning & hypnosis experimenters. Sleep-Learning Research Ass'n., Box 24-K, Olympia, Wash.

**REAL ESTATE
BE A BROKER**

PAY BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! Graduates report making substantial incomes. Start and run your own business quickly. Men, women of all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, and related subjects. **STUDY AT HOME** or in classrooms in leading cities. Diploma awarded. Write TODAY for free book! No obligation.

**FREE
BOOK
TELLS
HOW**

Approved for World War II and Korean Veterans
WEAVER SCHOOL OF REAL ESTATE (Est. 1936)
20205 Grand Ave. Kansas City, Mo.



\$6.00 or 2 FOR \$11.00!

With 40 ft. of wire. Additional wire 3¢ a ft.

TESTED AND GUARANTEED

Write for free list of all types of telephones. Shipments F.O.B. Simpson, Pa.

TELEPHONE ENGINEERING CO.
Dept. 10AO Simpson, Pa.

SIGN PAINTING

Home-Study Course—Only \$5.95

Teaches you commercial sign painting and sign building as it is being done TODAY in leading shops all over the country. Complete practical course for self-instruction. Shows latest methods of truck lettering, office doors, wood letters, reflecting signs, plaques, sprayed signs, gold leaf, silk screen process, up-to-date alphabets, money-making business information, etc. **SATISFACTION GUARANTEED OR REFUND!** Contains all the instruction of a high-priced correspondence course. Full price, only \$5.95, postpaid. Or C.O.D. plus postage. No risk—order today. Satisfaction or money back! Order "Sign Painting Course."

NELSON-HALL CO., 210 S. Clinton St., Dept. 2KP-1, Chicago 6, Ill.



NO MONEY DOWN!

Florida HOME-SITES
\$395

Lovely ¼ acre sites in Central Florida hills, lake, grove area \$395, no money down, \$10 a month • Suburb of Ocala, high and dry • Streets, utilities • 22 miles to Gulf Beaches • Fish, hunt • Invest or retire. **FREE** color folder • Write Dept. 619-A, Rainbow Park, Box 521, Ocala, Fla. AD 59067



HIGH WAGES!

High wages can be yours as an Operating Engineer of heavy construction equipment! Learn NOW to operate our diesel engine bulldozers, draglines, cranes, back hoes, rubber-tired scrapers and motorgraders! Machines of major manufacturers are used in our training program. Contractors are on our advisory staff. Full courses of 220 hours for bulldozers, scrapers, motorgraders; 440 hours for cranes. We invite comparison and inspection of the nation's original construction equipment operator's training school. We are NOT a correspondence school, but a fully equipped educational institution in the beautiful Piedmont area of North Carolina where you will live while you learn. Budget plan available. VETERANS: Ask about G.I. Benefits. Booking NOW for October and November classes.

Write TODAY for FREE School Catalog,
no obligation, to

NATIONAL SCHOOL of HEAVY EQUIPMENT OPERATION

Dept. D-10, P.O. Drawer 8415, Charlotte, N. C.
Western office: P. O. Drawer 45272, Los Angeles, Cal.

EYE GLASSES by MAIL As low as \$1.95

WRITE for FREE
CATALOG with 14
LENS SAMPLE CARD

Thousands of
Customers
Est. 1939



QUALITY READING — or BIFOCAL GLASSES for FAR and NEAR
Recommended for folks approximately
40 years or older who do not have astig-
matism or disease of the eye, and who
have difficulty reading or seeing far.

ADVANCE SPECTACLE CO. Inc., Dept. PS-10
537 So. DEARBORN ST. CHICAGO 5, ILLINOIS



ART-LEARN AT HOME Enjoy glamorous high-pay career
or profitable hobby. Learn Commercial Art, Painting, Cartooning,
Fashion Art, Lettering, TV, etc. We train you at home, in spare time.
TWO 22-pc. art outfits included free of extra charge. LOW COST—
only 20¢ a day. Write for FREE Book describing easy method. No
salesman will call. Washington School of Art, Studio 1510, Port
Washington, N. Y. (Estab. 1914) Tear this out as a reminder.

AVIATION CAREER

**SPECIALIZED EDUCATION / PROFESSIONAL
TRAINING...only 16 months to 2 years**

Top-pay prestige positions, bright future in aviation. Job
opportunities waiting for you as soon as you're ready. Air-
frame and Powerplant Technician, Aeronautical Engineering
Technologist, Business or Executive Pilot. Classes in Miami.

SEND FOR FREE 80-PAGE BOOK

Embry-Riddle Aeronautical Institute
Dept. S Miami, Florida (Founded 1926)

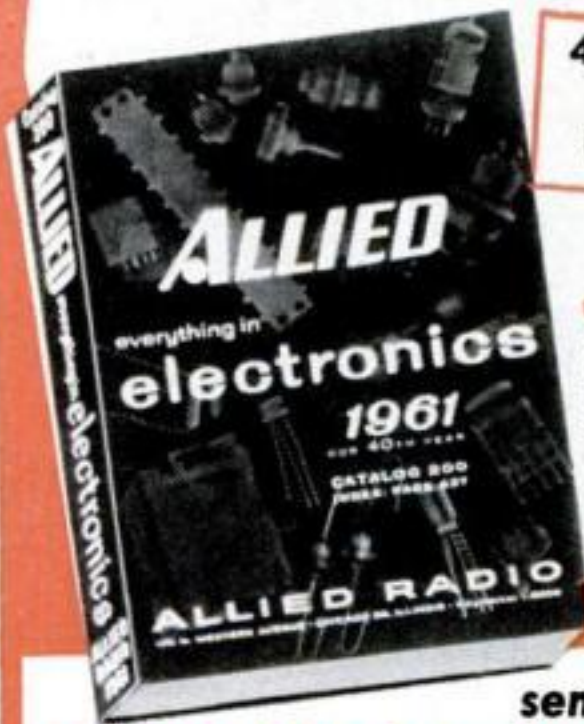
Name.....

Address.....

City.....Zone.....State.....

FREE!

ALLIED MONEY-SAVING 1961 ELECTRONICS CATALOG



**444-PAGES
COMPLETE
UP-TO-DATE**

ONLY \$2 DOWN
on orders up to
\$50; only \$5 down
up to \$200; \$10
down over \$200

send for it today!

Largest Selection—Lowest Prices

Send for the leading buying guide to every-
thing in Electronics, including products
available only from ALLIED. Builders, ex-
perimenters, hi-fi fans, Amateurs, service-
men, engineers—save most on:

- KNIGHT-KITS®—Best in Build-Your-Own
- Everything in Stereo High-Fidelity
- KNIGHT® Super-Value Stereo Hi-Fi
- Tape Recorders & Phono Equipment
- TV Tubes, Antennas, Accessories
- Parts, Tubes, Transistors
- Everything in Tools & Technical Books
- Amateur Station Equipment
- Citizen's Band 2-Way Radio
- Public Address & Paging Systems
- Latest Test & Lab Instruments



SAVE on everything in Electronics at
ALLIED. Get every buying advantage:
fastest shipment, expert personal
help, easiest-pay terms, satisfaction
guaranteed or your money back.
Send today for your value-packed,
FREE 1961 ALLIED Catalog.

YOU CAN DEPEND ON THE WORLD'S
LARGEST ELECTRONIC SUPPLY HOUSE

our
40th
year

ALLIED RADIO

ALLIED RADIO, Dept. 7-K
100 N. Western Ave., Chicago 80, Ill.

☐ Rush FREE 1961 ALLIED Catalog

Name.....

Address.....

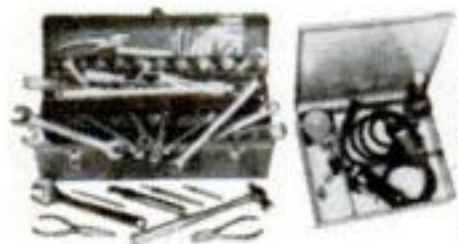
City.....Zone.....State.....

**SEND FOR
FREE
CATALOG**

START ^{at the} TOP

**Learn Auto Mechanics
at Home in Spare Time**

"America is short 100,000 auto mechanics," a famous magazine reports. "America needs 25,000 more auto repair shops," a noted motor executive says. Pay is tops. Work is steady everywhere. Two-thirds of all cars are in heavy-repair class! **Mail coupon for free new catalog and sample lesson.**



Tools & Tune-Up Kit Sent

CTI sends you professional Mechanic's Tools and valuable instruments, including a Compression Tester, Vacuum Gauge & Fuel Pump Tester, Ignition Timing Light; and a handy portable steel case.

MANY STUDENTS EARN CASH as they train. They fix cars on their own, or work in local shops. All facts free. **Mail coupon now for Catalog and Sample Lessons.**

COMMERCIAL TRADES INSTITUTE Dept. A-59
1400 Greenleaf Avenue • Chicago 26, Illinois
Send booklet, *Make Big Money in Auto Mechanics*

Name _____ Age _____

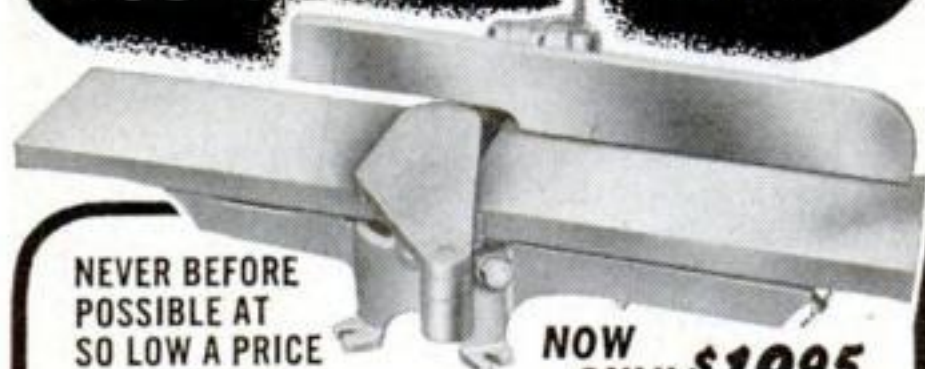
Address _____

City _____ Zone _____ State _____
Accredited by National Home Study Council



**REVOLUTIONARY NEW
DESIGN SAVES YOU \$20 TO \$40**

4 1/8" JOINTER PLANNER



**NEVER BEFORE
POSSIBLE AT
SO LOW A PRICE**

(shipped complete as shown)

**NOW
ONLY \$19.95**

SOLD DIRECT FROM FACTORY

Patents pending on revolutionary new engineering developments make this bargain possible. This is a power plane with all the features of machine tools costing 3 times OUR PRICE. It planes, rabbets, bevels, aids beveling and glueing joints; is so rugged and durable we guarantee it unconditionally for ten years.

SEE THESE QUALITY FEATURES

All cast iron and steel construction • Balanced steel cutter head • Hardened and ground knives • Precision ground cast iron tables • Rugged cast iron base • Table depth adjustable 0" to 3/8" • Cast fence with single action cam lock • Pat. lift-off aluminum guard • Big, full size—22" long • Shp. wt. 25 lbs.
Order By Mail — Sold Direct From Factory to You

OUR 30TH YEAR SEND \$19.95 CHECK OR M.O.
SENT C.O.D. WITH \$3.00 DEPOSIT
(If not completely satisfied after ten days return for full refund.) Shipped express collect.

AMERICAN MACHINE & TOOL CO., INC.
ROYERSFORD 59, PENNSYLVANIA

MEN PAST 40

**Afflicted With Bladder Trouble,
Pains in Back, Hips, Legs,
Nervousness, Tiredness.**

If you have these troubles, particularly bladder trouble, then your condition may be traced to Glandular Inflammation . . . a constitutional disease. Neglect of this condition often leads to premature old age and sometimes incurable malignancy.

The Excelsior Medical Clinic has a **New Free Book** that tells how thousands of men have been successfully treated here at Excelsior Springs for Glandular Inflammation by **NON-SURGICAL Methods**. They found soothing relief and a new outlook in the future of life.

This Free Book may prove of utmost importance in your life. Write Today. There is no obligation.

Excelsior Medical Clinic Dept. B6229 Excelsior Spgs., Mo.

GET INTO ELECTRONICS

V.T.I. training leads to success as technicians, field engineers, specialists in communications, guided missiles, computers, radar, automation. Basic & advanced courses in theory & laboratory. Assoc. degree in 29 mos. B.S. obtainable. ECPD accredited. G.I. approved. Graduates with major companies. Start Sept., Feb. Dorms, campus. H.S. graduate or equivalent. Catalog.

VALPARAISO TECHNICAL INSTITUTE
DEPT. S VALPARAISO, INDIANA

MAKE YOUR FORTUNE



Sell famous Spring-Step Cushion Shoes for all the family—men, women, children and babies! Earn big money daily plus Cash Bonus and Retirement Income with amazing 2-minute demonstration that sells on sight. Big repeat business. Full or spare time. America's Biggest Selection of Shoes for all the family. Free outfit given. No investment ever. Write today.

ORTHO-VENT Shoe Co., Inc.
4010 Brand Road Salem, Virginia

TRAINED AND SKILLED MEN IN

CLOCK AND WATCH REPAIR

Are Needed in Watchmaking, Electronics, Defense, Aviation, and other technical and precision instrument fields. NOW IS THE TIME TO LEARN THIS VALUABLE TRADE. But, Before You Enroll in Any HOME STUDY Course in Watchmaking, Write for Your Copy of "LEARN THE FACTS."

KANSAS CITY SCHOOL OF WATCHMAKING
1220 Admiral Blvd. Kansas City 6, Missouri

Secrets of VENTRILOQUISM Now Revealed!



Easy to learn in 60 to 90 days with our Home Study Course. **RESULTS GUARANTEED.** Make Money! Be Popular! Have Fun! Big Opportunity! Radio, Television, Stage Appearances! For Free Information regarding price and terms, WRITE. You must state your age. Dummy Catalog 25c. **MAHER HOME COURSE OF VENTRILOQUISM** Box 36, Studio PS-10, Kensington Station Detroit 24, Michigan

GUNS

COLLECT NOW!

- ☐ Colt Cobra .38
- ☐ German Luger
- ☐ German Mauser
- ☐ Spanish Moxley
- ☐ Russian Tokarev
- ☐ Japanese Nambu
- ☐ Italian Brevettata
- ☐ Frontier 44 Colt
- ☐ Belgium Automatic
- ☐ Colt .45 Automatic
- ☐ Czechoslovakian Pistol
- ☐ S & W .38 Police Special

**\$3.95
PPD.**

Authentic Replicas
Reproduced in Actual Size, Design and Balance. Solid Cast Aluminum. Finished in Gunmetal Black.

© 1958
He-man trophies for Den, Rumpus Room, Cabin, Etc.

Send 10 cents for illustrated folder.
Dept. S-10, Box 9068
Long Beach 10, California

LYTLE NOVELTY CO.,

SAVE UP TO 1/2 ON FINE ITALIAN CHORD ORGANS

Buy Direct-From-Importer... GET BIG DISCOUNTS

PLAY ON SIGHT! NO LESSONS NEEDED!

Here's the new musical instrument sensation that's suddenly captured the entire country! You and the children can play old and new songs in just a matter of minutes!... thanks to the famous DA-MAR System, included FREE! Makes music fun right from the start. Brings the whole family closer together as everyone joins in playing everything from hit tunes to lovely hymns. Best of all... you actually save 1/2 off mfr's list prices... buying direct from the importer. Pay only a small amount down... the rest just pennies a day!

HAND CRAFTED IN ITALIAN TRADITION OF QUALITY
Most domestic-made Electric Chord Organs use inferior plastic reeds... but every Philharmonic reed is made of finest, carefully treated Swedish Stainless Steel for superbly richer tonal quality and volume. Your Philharmonic Electric Chord Organ is largely hand crafted, just as any outstanding instrument should be! A giant in performance—yet it's light in weight, fully portable. Choose from a wide selection of models, including Piano-Key-board model for those with piano background. **DOUBLE GUARANTEED.** Get new FREE Color Catalog and lowest Direct Importer-to-You Discount Prices. Rush Coupon...

PIANO KEYBOARD MODELS ALSO AVAILABLE

FREE BONUS GIFTS

- Big Solo Kit...with special easy-play arrangements of favorite songs.
- Plastic Protective Cover
- Expandable Music Portfolio
- Chemically Treated Polishing Cloth
- **DOUBLE GUARANTEE**...gives you 100% certified protection.

Rush coupon for details

5 DAY FREE HOME TRIAL

Try it—play it—enjoy it in your own home on 5-FULL DAYS' FREE TRIAL. Only then can you appreciate how much fun the Philharmonic can bring into your home. Details free.

PHILHARMONIC ORGAN CORPORATION
Dept. P-100, 2003 West Chicago Avenue, Chicago 22, Illinois



EASY TERMS
SMALL DOWN PAYMENT
BALANCE only
PENNIES A DAY

24
MODELS

FREE! GET COLOR CATALOGS AND DIRECT IMPORTER-TO-YOU DISCOUNT PRICES

Philharmonic Organ Corporation—Dept. P-100,
2003 W. Chicago Avenue, Chicago 22, Ill.

Rush Color Catalogs and Lowest Discount Prices

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Millions have done it so can YOU!

Stop being SKINNY like I was
Quickly GAIN 25 LBS. of
HANDSOME, POWER-PACKED MUSCLES like I did
Send for these 5 AMAZING PICTURE COURSES
All 5 FREE before \$1 price goes back

1. How to GAIN MIGHTY ARMS
2. How to GAIN A BIG CHEST
3. How to GAIN A MIGHTY BACK
4. How to GAIN POWERFUL LEGS
5. How to GAIN A GRIP OF STEEL

Send 10¢ for postage for all 6 items

Also FREE Photo Book of Strong Men

Jowett Institute, Dept. PS-010, 220 Fifth Avenue, N.Y. 1, N.Y.

BIG EARNINGS WAITING

Be a TYPEWRITER REPAIRMAN

Earn while you train at home. Take your place in this booming multi-million dollar field. Skilled men are in demand—thousands more needed. Quickly step into a big-pay job or business of your own. **Learn to repair all makes easily.** You get expert guidance, clearly illustrated lessons, practice assemblies, a real typewriter and all professional tools you use FREE with course. **SEND FOR FREE BOOK**—Get vital government facts about urgent need for trained typewriter repair men. Free Book describes the vast opportunities waiting for you. Lic. by N. J. Dept. of Education. (Div. Technical Home Study Schools)

MAIL COUPON TODAY!

Typewriter Repair School, Dept. K-20, 150 Park Ave., E. Rutherford, N.J.
Send FREE Book, "Opportunities Unlimited", at no obligation.

Name _____
Address _____
City _____ Zone _____ State _____

Superior's New Model 70 UTILITY TESTER® FOR REPAIRING ALL ELECTRICAL APPLIANCES MOTORS • AUTOMOBILES • TV TUBES

As an electrical trouble shooter the Model 70:



- Will test Toasters, Irons, Broilers, Heating Pads, Clocks, Fans, Vacuum Cleaners, Refrigerators, Lamps, Fluorescents, Switches, Thermostats, etc.
- Will test all TV tubes for open filaments, inter-element shorts, burned out tubes, etc.
- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, Leakage, etc.
- Will measure current consumption while the appliance under test is in operation.
- Incorporates a sensitive direct-reading resistance range which will measure all resistances commonly used in electrical appliances, motors, etc.
- Leakage detecting circuit will indicate continuity from zero ohms to 5 megohms (5,000,000 ohms).

As an Automotive Tester the Model 70 will test:

- Both 6 Volt and 12 Volt Storage Batteries • Generators • Starters • Distributors • Ignition Coils • Regulators • Relays • Circuit Breakers • Cigarette Lighters • Stop Lights • Condensers • Directional Signal Systems • All Lamps and Bulbs • Fuses • Heating Systems • Horns • Also will locate poor grounds, breaks in wiring, poor connections, etc.

Model 70 comes complete including 64 page book, only... \$15.85

SHIPPED ON APPROVAL
NO MONEY WITH ORDER—NO C. O. D.

Try it for 10 days before you buy. If completely satisfied then send \$3.85 and pay balance at rate of \$4.00 per month for 8 months — **No Interest or Finance Charges Added!** If not completely satisfied, return to us, no explanation necessary.

MOSS ELECTRONIC, INC.

Dept. D-8013849 Tenth Ave., New York 34, N. Y.
Please rush Model 70. If satisfactory, I will pay on terms specified. Otherwise I will return tester.

Name _____

Address _____

City _____

Zone _____ State _____

All prices net, F.O.B., N. Y. C.

ENGINEERING

HOME
STUDY
COURSES

Courses written by world authorities in all branches of engineering and science. Step-by-step instructions using methods proved successful by thousands of our graduates. One hour each day in your spare time will start you off to higher pay, security and prestige. Fill in the coupon to-day and indicate the course of interest. We will send you a complete outline of the course with a booklet describing the Institute and our advanced teaching methods.

CIVIL ENG.
SURVEYING
ARCHITECTURE
FORESTRY
STRUCTURAL
MECHANICAL ENG.
INDUSTRIAL ENG.
REFRIGERATION
DRAFTING
ELECTRICAL ENG.
RADIO
ELECTRONICS
TELEVISION
AERONAUTICAL ENG.
HIGH SCHOOL
CHEMICAL
MATHEMATICS
ACCOUNTING

MAIL THE COUPON TODAY

Canadian Institute of Science & Technology Ltd.,
756 Century Bldg., 412, 5th St. N.W., Wash., D.C.

NAME.....

ADDRESS.....

CITY.....STATE.....

COURSE OF INTEREST.....

Canadians: Send to C.I.S.T., 756 Garden Bldg.,
263 Adelaide St. W., Toronto, Ont.



C. I. S. T.

594



Olson

Olson Radio Catalogs

FREE

8 Different Issues

Fill in coupon for a FREE One Year Subscription to OLSON RADIO'S Fantastic Bargain Packed Catalog — Unheard of LOW, LOW, WHOLESALe PRICES on Brand Name Speakers, Changers, Tubes, Tools, Hi-Fi's, Stereo Amps, Tuners and other Bargains.

NAME.....

ADDRESS.....

CITY.....ZONE.....STATE.....

OLSON RADIO CORPORATION

113 Forge Street

Akron 8, Ohio

PROTECT YOURSELF

with this Fountain Pen-Type POCKET

TEAR GAS

DEVICE... \$15 VALUE 38 Special Cal.

\$5.95 Exp. Additional
Col. shells 50c ea.
with 1 shell

For police or civilian defense against robbers, mashers, etc. Causes no permanent injury. Highly polished heavy nickel case with spring-steel pocket clip.

SEND CHECK OR MONEY ORDER. NO COD'S

This Product is not intended for sale in states or localities which have laws forbidding their sale.

PUBLIC SPORTS SHOPS, DEPT. P-1 11 S. 16th St., Phila. 2, Pa.



Nickel Plated
Peerless Type
HANDCUFFS

\$15.00 value **\$7.95**
SPECIAL pr.

Deluxe leather carrying case \$2.50

Registered Colt Distributors
Suppliers for
Official Police Equipment



ALL FAMOUS BRANDS!

FARM
TRUCK
AUTO

AT LESS
THAN
WHOLESALE

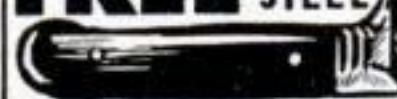
SAVINGS NEVER LESS THAN 50% up to 70% OFF REG. PRICE!

HEADQUARTERS for ALL SPORT CAR TIRE SIZES

FREE • SEND FOR YOUR FREE CATALOG • FREE!

RELIABLE TIRE DIST., 728 Morgan Blvd., Camden 4, N.J.

FREE GERMAN STEEL HUNTING KNIFE



4-INCH BLADE

We give you handiest hunting and fishing knife you've ever had! Has 4-INCH LONG highly tempered steel blade—VERY SHARP! Attractive handle. We send knife FREE to acquaint you with our below-wholesale bargains. Please send 25¢ for handling. NO LIMIT—but send 25¢ handling for each knife. Order TODAY! HUNTING KNIFE, Dept. K-514, Box 881, St. Louis, Mo.

GOVERNMENT OIL LEASES LOW AS \$1 PER ACRE.

You do no drilling, pay no taxes, may realize a king-size profit without ever leaving home. Write for free map and literature.

AMERICAN OIL SCOUTS, Dept. PS

8350 Santa Monica Blvd.

Los Angeles 46, Calif.

LEARN PLASTICS



COMPLETE LOW COST SHOP METHOD
HOME TRAINING NOW AVAILABLE

Get in on Big Money opportunities in Plastic molding, casting, forming, carving, etc. Earn as you learn with Interstate's professionally prepared course. All plastic materials furnished.

WRITE FOR
FREE
BOOKLET

INTERSTATE TRAINING SERVICE

DEPT. C-2, PORTLAND 12, OREGON

WORLD'S LOWEST PRICED CALCULATOR!
NEW! NEW! NEW!

TOM THUMB ADDING MACHINE

With beautiful Leatherette carrying case.
MADE IN AMERICA BY AMERICANS
Beware of cheap imported imitations.
Adds Up To One Billion—1,000,000,000
Subtracts—Multiplies—Divides
Mistake Proof—Positively 100% Accurate—
Lightning Fast—Shock Proof Solid Steel Mechanism
GUARANTEED FOR YOUR LIFETIME

Ideal for Housewives, Shoppers, Students, Engineers and Tax work. Take it to the Super Market—Save \$\$\$ every week. We pay postage if you send check, cash or money order—or just send your name & address and pay postman \$1.97 plus postage. Immediate Delivery—10 Day Free Trial—Satisfaction Guaranteed money refunded by return mail. Special Gift Offer: 2 Machines for only \$3.49 Agents Wanted—Make easy money selling a Top Quality Calculator at our unbelievably low price.

TOM THUMB ADDING MACHINE
P.O. Box 5066, Dept. O-20, Philadelphia 11, Penna.

Not \$3.95
But Only **\$1.97** in
Penna. includ-
ing 3% Tax.



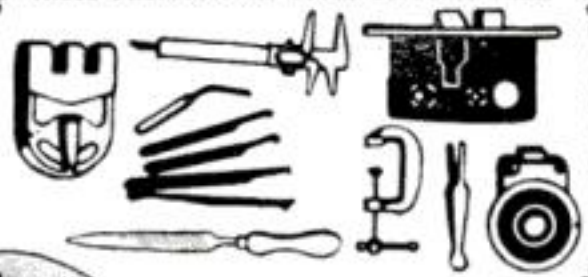


"I Earn Two Incomes Now!"

Says **JOHN BENNIE, Pittsburgh, Pennsylvania**

"Thanks to your wonderful training, I have been able to earn \$20 to \$25 extra each and every week doing little locksmith jobs at home and after work at my regular job. This is the best trade a man can take up."

THESE PROFESSIONAL TOOLS SUPPLIED FREE!



Be a LOCKSMITH

Train at HOME—Earn While You Learn

Add 50%—100% to YOUR INCOME with easy spare time earnings. Cash in on the nation-wide shortage—trained locksmiths are in demand! Quickly step into a big pay opportunity job or start a high-profit shop of your own.

Earn Extra Money RIGHT AWAY! All Special Tools, Supplies Furnished FREE.

Age, education, minor physical handicaps don't matter in this growing trade. You can quickly qualify as a skilled locksmith. It's like a fascinating hobby. Study at home as little as one hour a week. Gain practical experience through well-illustrated lessons. Do real jobs on car locks, house locks, padlocks and safe locks, under the guidance of experts.

FREE illustrated book, write now.

LOCKSMITHING INSTITUTE, Dept. 210

(Div. Tech. Home Study Schools)

150 Park Avenue, E. Rutherford, N. J.

**SEND FOR
FREE BOOK!**

PROFESSIONAL TOOLS

**FREE
WITH COURSE.**

**APPROVED FOR
VETERANS**

MAIL COUPON FOR FREE BOOK.

For a future as your own boss or in a high-pay job, write now for FREE illustrated book. Only school of its kind. Licensed by State of New Jersey.

Accredited,
Nat'l Home
Study Council
MAIL COUPON NOW!

**LOCKSMITHING INSTITUTE, Dept. 210,
150 Park Avenue, East Rutherford, N. J.**

Please send without obligation the FREE illustrated book, "Your Opportunities in Locksmithing." I understand no salesman will call.

Name..... (Print Here)

Address.....

City.....Zone.....State.....

**SPECIAL
LOW PRICE!**



\$47⁵⁰

"ORIGINAL" FRONTIER® SIX-SHOOTER REVOLVER

This is the first time in twenty years that an exact copy of Col. Colt's Frontier Six-Shooter Revolver has been offered at such a low price. Don't settle for a watered down or midget version of the real thing. Now you can have the original gun at a price you can afford. Really the most beautiful Frontier Six-Shooter revolver you have ever seen. Excellent for hunting, plinking, home protection or fast draw.

Special low price of.....**\$47⁵⁰**
Blue steel finish. .22 S.L.R. Caliber.
Full 40 oz. weight. 5 1/2" BBL.



QUICK DRAW BELT & HOLSTER

Beautiful heavy leather outfit. Not a kit, but complete and ready to strap on. Special low, low unheard of price at only \$12.50. Send belt size. Choice of black or natural tan. Comes in .22 cal. bullet loops only. \$1.00 extra for any other caliber.

FRONTIER MANUAL
Send 50¢ coin for new manual. Includes special low prices of parts, holsters, grips, etc. Information on how to quick draw, etc.

FRONTIER® DERRINGER

\$19⁹⁵



An exact copy of the original Remington 41 cal. over & under Derringer, now made in modern metal for modern cartridges. Wonderful pistol for hunting, plinking home and personal protection. A perfect second gun for police officers.

All guns shipped express. Shipping charges collect.

SPECIAL PRICES FOR DERRINGER PISTOLS AND ACCESSORIES

22 S. L. R. Cal. Standard Model Blue Finish	\$19.95
22 S. L. R. Cal. DeLux Model Chrome Finish	\$24.95
22 Magnum Cal. DeLux Model Chrome Finish	\$29.95
38 Special Cal. DeLux Model Chrome Finish	\$34.95
Western Model Holster & Cartridge loop belt	\$ 7.50
Detective Model Spring Clip Under pant Holster	\$ 8.50
Real Pearl Grips	\$10.00
Real English Stag Grips	\$ 8.00

HY HUNTER FIREARMS MFG. CO., dept. P-2
8255 Sunset Blvd., Hollywood 46, Calif.

GUARANTEE: All Hy Hunter guns are 100% guaranteed. You have to be satisfied. DEALERS INQUIRIES INVITED

FREE!
CANADIAN
STAMP
COLLECTION



RUSH reply. Big-value collection, historic Canadian Commemorative Stamps given free! Choice, scarce stamps issued over the years. Many large size, multi-colors including Royal Family, British Columbia Centennial, other colorful historic issues. All genuine, all different. Here's a rare chance to round out and increase the value of your collection. This offer never made before. Rush name, address for your FREE stamps and other valuable offers for FREE inspection. Include 10¢ for handling and postage. Garcelon Stamp Co., Dept. OPSM, Calais, Maine.

GARCELON STAMP CO., Dept. OPSM, Calais, Maine. Rush Free Canadian Commemoratives, other offers for inspection. Enclosed 10¢ for handling. PLEASE PRINT.

30 POWER ACHROMATIC TELESCOPE

Coated, Optical Ground, Color Corrected
with Heavy Lined Pigskin Case

Made by one of Japan's top optical instrument manufacturers, this 30x30mm telescope is ideal for the study of birds, animals, ships at sea, stars, planets—any distant object that you wish brought up *really close* with the kind of needle-sharp, color-free viewing only a genuine *achromatic* lens can bring you. Chromium plated draw tubes extend to 13½". When collapsed, telescope fits into snap-closure pigskin case 7½"x1½" with leather strap.



only
\$6.95
ppd.

75c ea. for Finest Imported PRECISION PLIERS!

• Flat NOSE • Combination • Diagonal Cutter • End Cutting Nippers • Round Nose • One Side Flat—One Side Round • Snipe

FOR JEWELERS, OPTICAL WORKERS, HOBBYISTS, CRAFTSMEN OF ALL KINDS! These superb European instruments are of deep-forged, heat-treated high quality tool steel, fabricated to most exacting specifications. All-over ground and polished to smooth hard surfaces. Jaws meet perfectly to safely and securely hold even the most delicate objects. Each plier is 4" long and veritable gem of precision and strength.



75c each ALL 7 for \$5.00 ppd.

Rugged 6000 Lb. Test NYLON TOW CABLE

If ever stuck in snow, mud or ditch, there's nothing handier to have in your car than a super-strong, All Nylon Tow Cable. Test proven to over 6000 lbs. pull, more than enough for even the biggest trucks and cars. One end has heavy steel snap clamp while other end is looped. Measures 15 ft. long. Also invaluable in home and for industry.

\$2.98

Plus 25c
pp. & hdg.



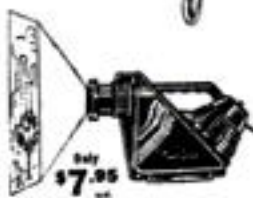
Patented, UL Approved, Made in U. S. A. Precision

MAGNAJECTOR

Projects Pictures in Full Color up to
FOUR FEET WIDE

No films or negatives required! Adjustable Twin Lens enlarges ANYTHING—Illustrated or printed—Photos—Clippings—Fine Print—Coins—Stamps—Maps—even tiny insects and butterflies—against any flat white screen or surface!

Operates on regular 115 Volt A. C. with ordinary electric bulb. MAGNAJECTOR is precision made to last a lifetime. Measures 12" x 8" x 4½" and comes with 6' extension cord and insulated plug, complete and compact in a handy luggage type carrying case.



only
\$7.95

ONLY
\$7.95
postpaid

Send Check or M.O. If C.O.D. Fees Extra
MONEY BACK GUARANTEE

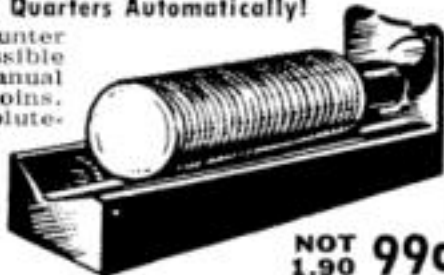
SCOTT-MITCHELL HOUSE, INC.

Dept. W-1 415 S. Broadway Yonkers, N. Y.

Counts & Wraps Coins Fast!

Counts Pennies, Nickels, Dimes, Quarters Automatically!

Thoresen Automatic Coin Counter ends fuss, fumbling and possible errors of slow old-fashioned manual way of counting & wrapping coins. Automatic Coin-Counter is absolutely 100% accurate. Thousands in use in banks, schools, churches, offices, etc., everywhere! Exclusive feature! With Coin-Counter you use Plain Paper, Flat Wrappers or Tubular Wrappers. No. 789, Automatic Coin-Counter, 99c plus 11c post. & hdg. Order 2 for \$2 complete. Satisfaction guaranteed or money back. Sorry, no COD's.



NOT
1.90 99c

Sold Only by THORESEN, Inc., Dept. 7-L-789
585 WATER STREET, NEW YORK 2, N. Y.

YOU CAN BE A REAL HE-MAN!



CHARLES
ATLAS

DON'T let anybody tell you that you're just "naturally" skinny . . . flabby . . . soft. I'll show how you can have the handsome muscle-mighty HE-MAN BODY that Nature meant you to have! In just 15 minutes a day I can make you a NEW MAN! I'll build smooth, powerful layers of muscle wherever you want 'em—arms, chest, stomach, back, legs, etc.—send wonderful new pep and energy surging through your whole body!

WRITE FOR FREE BOOK. Tells about famous "Dynamic Tension," the NATURAL way I built my own famous body. How I've built up other fellows. What I can do for YOU. Address:

CHARLES ATLAS, Dept. 110
115 E. 23rd St., New York 10, N.Y., In England: Chitty St., London, W.1

Send for
FREE
BOOK



NEW WESTERN HAIG

.12 CALIBER
SPECIAL FACTORY
OFFER!



\$3.00
post-paid

USES POWDER CHARGE

This small bore gun shoots .12 cal. lead bullets fired by small 4.4 mg. powder charge. Not a CO₂ gun! You'll like the handsome lines, grip, and balance. Western in style, but patented ball and cap action allows this low price. 9¾" steel barrel cased in knurled styrene stock, overall 13½". Develop pistol form, accuracy at a fraction of cost of large caliber pistols. Comes with 50 lead bullets. Satisfaction guaranteed. Send \$3 to: HAIG MFG. CO., Box K-30, San Gabriel, Calif.

MEN WANTED

Master a trade with a future—learn Auto-Diesel mechanics in our shops. You learn with tools on real equipment. Earn while you learn. Many of our graduates earn \$100 per week and up. No previous experience necessary. Day and night courses. Approved for veterans. Write for free bulletin.

Earn \$100 Per
Week and up

AUTO DIESEL
MECHANICS

NASHVILLE AUTO-DIESEL COLLEGE

226 7th Ave., N., Dept. 41

Nashville 3, Tenn.

INVENTORS NEEDED AT ONCE

If you have an invention you wish to sell outright or license on royalty, write us at once. We are seeking inventions of household items, games, toys, sports items, tools, and mechanical and technical devices. Patented or unpatented. For further information and free brochure outlining manufacturers' requirements, royalty rates, send your name and address (no drawings, please) to us by letter or on postcard at once.

KESSLER CORPORATION, Dept. D-710, Fremont, Ohio

ELECTRIC RAZOR SHARPENING KIT \$1.00 ppd.



Amazing new kit sharpens electric razor in 3 minutes without taking razor apart. No work involved—just dip razor in liquid sharpening compound and run 3 minutes—blades are honed to a perfect fit. Gives you cleaner, faster shave. Works same miracle for home Electric Hair Clippers—saves you \$\$\$\$ on repair bills. Money back Guarantee.

ERC COMPANY Rt. #1, Box 352
Salem, Oregon

All Aluminum Boat Kits



Alumakit® Co., Inc.

1012 Shetland Industrial Park, Salem, Mass.

Assemble a 14 ft. boat yourself in one weekend for \$99! Factory-finished aluminum parts, one-unit hull. No bending, no riveting. Save up to 60% of factory-built prices. Perfect car-toppers for sportsmen. Models up to 14 feet. Send 10c today for complete catalog.

\$58
UP

Pat. Pend.

TELEPHONES



\$3.00

2 for \$5.00

MODERN CRADLE STYLE

Genuine telephone company phones, re-conditioned. Ideal for Inter-House, House-to-Barn, Office to Shipping Room, etc. Battery operated. Guaranteed. Also, Magneto Telephones for Farms, Camps and Mines. Telephone Materials and Supplies of all kinds.

TELEPHONE DEPT. PS-608, 1760 Lunt Ave., Chicago 26
"America's Largest Independent Telephone Repair Shop"

MAGIC MAIL PLAN

that comes with this Little Machine
CAN MAKE YOU \$5.00 AN HOUR



The machine is turning out a job that will bring operator \$2.58, by mail. Material cost, only 11c!

Write today for free facts about the newest and most fascinating of all new home operated businesses. For the first time, a simplified machine brings the fabulous profits of Plastic Sealing and Plastic Laminating within reach of the small operator. Anyone can learn to operate it with a few minutes practice. Then—with our MAGIC MAIL PLAN—can get mail orders pouring in daily with cash in every envelope.

No Canvassing or Selling

Fill orders at home in spare time to start. Then expand to full time business. We even supply circulars to bring back cash and orders. Rush name for all the facts you need to start. A postcard will do. No charge.

WARNER ELECTRIC CO., Dept. L-3-L
1512 Jarvis, Chicago 26, Illinois



MANUFACTURE this BEAUTIFUL OUTDOOR FIREPLACE in YOUR OWN BACKYARD

\$4.00 worth of sand and cement produces this attractive fireplace. Sells on sight from \$60 to \$80. Easy to start your own profitable business in your backyard. No experience necessary. Big profits. Exclusive manufacturing territories. Write immediately for full details. General machines sold to U.S. Government. Dealer inquiries invited.

GENERAL ENGINES CO., INC. Dept. SF-100 Rt. 130
Thorofare, N. J.

High School at Home

No classes...interesting spare-time home study; standard texts; credit for previous schooling; diploma awarded. Equivalent to resident school work. If you've completed 8th grade and are over 17, write for free catalog and Sample Assignment in English Review.

Accredited Member, National Home Study Council

Wayne School of La Salle Extension University

A Correspondence Institution

419 So. Dearborn St., Dept. 1058W, Chicago 5, Ill.

LAW FREE BOOK THE LAW TRAINED MAN

Write today for a FREE copy of illustrated law book, "THE LAW-TRAINED MAN," which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost; convenient monthly terms. Write for FREE law training book today.

Blackstone School of Law, 307 N. Michigan Ave.

Founded 1890 Dept. 127, Chicago 1, Illinois

MY SPARE TIME HOBBY MAKES ME
\$5.00 an hour
CASH PROFIT

—Grover Squires



START YOUR OWN SPARE TIME BUSINESS

You can turn your spare time into Big Cash Profits with your own COMPLETE SHARPENING SHOP... Grind saws, knives, scissors, skates, lawn mower blades...all cutting edges. Your Own Cash Business with no inventory right at home...no experience needed.

FREE BOOK tells how you can start your own spare time business while you are still working at your regular job. Low Cost—time payments only \$15.00 a month. Send postcard today.

BELSAW SHARP-ALL CO., 701 Field Bldg., Kansas City 11, Mo.

Here's a unique opportunity...

own a high-profit second business that runs itself!

Open a Philco-Bendix Self-Service Laundry Store!

Many store owners, executives, professional people—businessmen of all kinds are going into the self-service laundry business. The reasons are obvious. Many of these new-type laundry stores are delivering a 25% return on a small capital investment.

Here are some of the facts: The coin-operated laundry business is one of the fastest-growing businesses in the country. Customers simply come into the store, wash and dry their clothes in metered machines and leave. They bring their own washing supplies or buy them from vending machines in the store.

Minimum supervision required. A coin-operated laundry needs no attendant. Only a couple of hours a week are required to empty the coin boxes and supervise efficient operation. There are no credit problems—strictly a cash business. Machine repair and daily maintenance can be contracted to local people. An owner can spend full time with his regular business or practice and let the coin store run itself.

Why are they so successful? Philco-Bendix coin-operated laundry stores offer a customer up to 65% saving over attended-type wash-and-dry service. They are convenient for busy people because they remain open 24 hours a day, seven days a week. They give customers a chance to do their own washing—their own way.

Small initial investment. The over-all cost of opening one of these stores equipped with Philco-Bendix Commercial Washers and Dryers, the only line of commercial equipment engineered for coin use, is surprisingly low. Only a small initial investment is required. The balance may be financed through Philco Finance Corporation. Return is so rapid that many investors amortize the total cost within a year.

Act now! Investigate this exciting business opportunity today! Send the coupon for full data on business locations in your area and valuable help in all phases of planning, financing and promoting a successful coin store.



COMMERCIAL LAUNDRY SALES

Philco-Bendix Commercial Laundry Equipment is brought to you by Philco Corporation.

PHILCO CORPORATION

Commercial Laundry Adv. Dept. PS-1
Tioga and C Streets, Philadelphia 34, Pa.

Please send me information right away on Philco-Bendix Commercial Laundry Equipment... also the name of my local distributor.

Name _____

Address _____

City _____ Zone _____ State _____

TRAINED MEN NEEDED!

IN INDUSTRY—ARMED FORCES
BIG PAY!—GOOD FUTURE!

☐ DIESEL

☐ ELECTRONICS

☐ AUTO

☐ AUTOMATION

NEVER BEFORE has the opportunity been so good for the properly trained mechanic and technician to step into BIG PAY POSITIONS with rapid advancement and future security virtually assured.

YOUR SUCCESS depends on the quality of training you receive... and the reputation of the school you attend.

YOUR GUARANTEE we are giving the best in mechanical and technical training is proved by the fact... High pay jobs in Industry, and ratings in the Armed Forces now waiting for our graduates.

RESIDENT SHOP TRAINING is easier and costs less than you may think! We provide you with housing and part-time jobs while in school, plus free nation-wide placement service for graduates.

Check subject above in which you are interested and mail for

FREE BOOKLET

BAILEY
Technical Schools

Veteran Approved

626 S. Grand, Rm. 50, St. Louis 4, Mo.

Your Future
IN
ELECTRONICS
AND
AUTOMATION

Your Future
in...
DIESEL and
AUTO
MECHANICS

Name _____ Age _____
Street _____
Town _____ Zone _____ State _____

FREE **GIANT 1961**
204 PAGE
CATALOG

BA 1961
ANNUAL CATALOG 611

SINCE 1927

A Complete Buying Guide for Everything in
RADIO TV
ELECTRONICS

BURSTEIN-APPLEBEE CO.

Dept. P5, 1012 McGee St., Kansas City 6, Mo.

☐ Send Free 1961 B-A Catalog No. 611

Name _____

Address _____

City _____ State _____

SEND FOR IT TODAY

SAVE UP TO 50% ON B-A SELECTED KITS

HI-FI AND STEREO SYSTEMS & COMPONENTS

TOP VALUES IN POWER AND HAND TOOLS

30 PAGES OF BARGAINS NOT IN ANY OTHER CATALOG



What a Brand Name tells you

A Brand Name says you can buy with assurance because you'll get the quality you expect.

Brand Names are built on your confidence. You and your neighbors dictate the standards a Brand Name product must meet to consistently deliver the value and service you want.

A respected Brand Name is a manufacturer's most valuable asset and he spares no effort to protect it by constantly testing and bettering his product.

A Brand Name is the maker's guarantee of satisfaction doubly endorsed by the dealer who sells it.

For dependable quality and complete satisfaction you will do better with the brands you know, get to know those you see advertised in this magazine.

To get the most for your money buy by Brand Name and be sure!

A Brand Name is a maker's reputation



**Buy the Brands you trust
at the store you know**

BRAND NAMES FOUNDATION, INC.
437 FIFTH AVENUE, NEW YORK 16, N.Y.

—NOW—IN—JUST 4'—OF—SPACE—

LET YOUR FAMILY ENJOY THE REAL THRILL OF PHOTOGRAPHY



COMPLETE BESELER HOME DARKROOM!



Purchased separately,
this equipment
would cost \$287.00.
In the Beseler Home
Darkroom Outfit,
complete, only **\$195.00**

Start tonight!

Just unpack the box — and only 4 feet
of space in your bathroom, basement or closet becomes
a fully equipped, modern home darkroom!

The world famous Beseler 23C Enlarger is the "heart" of the Dream Darkroom Outfit. It's so versatile and precisely engineered that you can make enlargements as big as you want them—even mural size—in black and white or full, brilliant colors from 8mm up to 2 1/4 x 3 1/4 size negatives. Beseler 23C is the very same enlarger used in thousands of small studios and advanced amateur darkrooms. Yet, it works so simply that you'll produce big, beautiful prints the first time you try it.

And with this precision enlarger you receive everything else you need to set up your darkroom—25 pieces of custom matched equipment.

**MAKES AN IDEAL LIFETIME GIFT FOR
THE ENTIRE FAMILY . . . WRITE FOR FREE BOOKLET**

CHARLES BESELER COMPANY

214 South 18th Street, East Orange, New Jersey

Please send FREE booklet, "Fun In The Darkroom"

Name _____

Address _____

City _____ Zone _____ State _____



AT LAST IT'S HERE

AMAZING SWISS ELECTRIC SHAVER

WORKS ON FLASHLIGHT BATTERIES ALONE

**THE SKILLED HANDS OF THE SWEDISH CRAFTSMAN ARE
RESPONSIBLE FOR THIS FINE PRECISION INSTRUMENT.**

- No plug, no cord, no separate battery case.
- Largest shaving area of any rotary electric shaver in the world.
- Exclusive self-sharpening blades—get sharper as you use them.
- Powered by ordinary flashlight batteries that last up to 5 months.
- Genuine rotary motor (not a vibrator), spins double-bladed rotary head.

Now, any man can get a shave anywhere, in a car, in an office, in a boat. Lord Riam gives a skin-level shave on all whiskers—heavy or light. Fully guaranteed for one full year on all parts and service. **ORDER BY MAIL! Only \$12.95 post-paid (less batteries).** Send check or money order to:

MAIL ORDER MART, P. O. Box 3053, St. Louis 30, Missouri

LEARN MEAT CUTTING AT NATIONAL

Pay After Graduation

The steady dependable trade of Meat Cutting taught easily in 8 short weeks. **YOU LEARN BY DOING** under actual meat market conditions in big modern school at Toledo.

For beginners or men with experience. Get a profitable store of your own. Remember, **PEOPLE MUST EAT!** Big pay jobs. Free employment help. Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established 37 years. Get National training **NOW**. Pay your tuition in easy monthly payments after you graduate. Send coupon for **FREE** 40 page school catalog — **TODAY**. G.I. approved.

National School of Meat Cutting, Inc., Dept. 51-K, Toledo 4, Ohio

Send me your **FREE** school catalog on National Training at Toledo in Meat Cutting, Meat Merchandising and Self Service Meats. No obligation. No salesman will call.

Name _____ Age _____

Address _____

City _____ State _____

Approved for Veterans

Curious Coins!

ODD PAPER MONEY!

Worth \$1 — But Yours

FREE!

to get names for our mailing list

SEND TODAY for this valuable packet of odd and curious coins, paper money — an exciting introduction to fastest growing hobby in the world! You'll find coins from Formosa (Free China—our ally). Belgium, neighboring Mexico, far off Pakistan, etc. Actual value at least \$1—but yours FREE on this special offer!

JOIN THE FUN RIGHT AWAY

This is our way of showing how much fun others have collecting strange money — Money over 1500 years old — Gambling coins from old Siam — Tokens used for barter before Christ — and other exciting curios. All listed with other valuable offers for inspection. Get FREE packet of coins and money—plus \$100,000 Confederate Money bonus—by sending coupon (with 10¢ for shipping) to: LITTLETON COIN CO., Dept. PS-10, Littleton, N. H.

ALSO FREE!



\$100,000 in CONFEDERATE "MONEY"!

These lots-of-fun facsimiles are yours for promptness while the supply lasts.

LITTLETON COIN CO., Dept. PS-10, Littleton, N. H.

Rush FREE packet of "Curious Coins and Currency" plus \$100,000 in Confederate "money." I enclose 10¢ to help cover shipping. Also send lists of rare coins available and other offers for inspection. No obligation to buy.

Name.....

Address.....

City.....Zone...State.....

NEW PLASTI-FORM MYSTERY MACHINE turns Kitchen Table into Manufacturing Plant!

UP TO \$25 AN HOUR Spare Time



LAMINATES • FABRICATES MOULDS • PLATES • ENCASES

Sensational new device with endless applications. Sets up on any small table, does more than a dozen machines 10 times its size. Anyone can operate, even teen-agers or grandparents. Most exciting home-business development in 50 years!

MAKE 110 ITEMS WITH MATERIALS COSTING 50¢

From any small model, your Plasti-Form Machine moulds thousands more for pennies each, even if original cost \$10 or more. Bronzes baby shoes for ¼ usual cost. Laminates practically anything in permanent plastic seal—every rainbow color, or chrome, silver plate, etc. Wall plaques selling up to \$15 in stores duplicated for 50¢. Makes over 15,000 items to sell below market prices, and still make huge profits!

Get Orders by Mail...We help Finance You!

Complete "Business-by-Mail" Plan brings cash orders from everywhere, no matter where you live — from families, stores, factories. Don't hold back if short of money. Cost is small & we help finance you. Write for FREE Plasti-Form Booklet, Table-Top Mfg. Ideas & Home Mail-Order Plan.

PLASTI-FORM CO. Dept. G-10, 15125 SO. HWY, GARDENA 81, CALIF.

FREE! ALL THREE

- 1 Complete Revealing Plasti-Form Machine Booklet
- 2 Confidential Table-Top Manufacturing Ideas
- 3 Special Home Mail-Order Plan Details

Make Your Own NISSEN REBOUND TUMBLING UNIT



Write for your free parts catalog and frame construction plans.

®TM Reg. U.S. Pat. Off. for Nissen Rebound Tumbling Equipment.

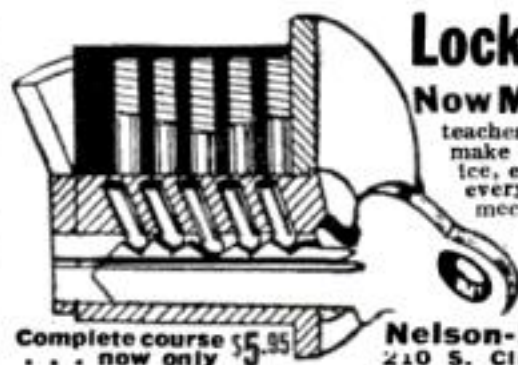
NISSEN TRAMPOLINE® CO., Cedar Rapids, Iowa
Official NCAA and AAU Rebound Tumbling Equipment



HEAVY EQUIPMENT MECHANICS

WANTED: Men to train for excellent pay, exciting work, wide-open future! Learn how to maintain, trouble shoot heavy duty construction and earth-moving equipment. Work for major contractors or your own business! Train on latest model diesel bulldozers, trucks, cranes, scrapers, etc.! Experienced instructors. 13½ week intensive course. Write today for FREE Catalog. Complete details. Attn: S. M. Hutch

GREER TECHNICAL INSTITUTE Box 368 Braidwood, Illinois



Locksmithing AND KEY MAKING

Now Made Easy! Practical up-to-date course

teaches you how to pick locks, de-code, make master keys, repair, install, service, etc. New self-instruction lessons for every handyman, homeowner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith. 53 easy illustrated lessons. Full price only \$5.95, postpaid; or C.O.D. plus postage. Satisfaction or refund guaranteed.

Nelson-Hall Co., Dept. KP-1
210 S. Clinton St., Chicago 6, Ill.



I'LL HEAT THAT COLD ROOM

I am a high volume warm air BOOSTER FAN

Install me in the pipe that runs to your "cold room" and I will keep it warm. Simple to install—fits any pipe 8" or larger, round or rectangular. State size of duct. Plugs into 110V socket. Used by furnace men for 20 years. Guaranteed. Directions. Only \$8.85 postpaid.

P. K. PRODUCTS COMPANY
417 Grattan Dept. 6100 Topeka, Kan.



"\$7,108.50 FIRST YEAR SERVICING RADIATORS!"

— Hank Konter, Newcastle, Wyo.

Make good money servicing auto-truck-tractor radiators. Easy to learn. Inland, world's largest radiator equipment mfr., offers complete package — equipment, merchandising, "pays-for-itself" financing, free training. Small down payment on equipment starts you. Profitable dept. for garage or service station. Write

INLAND MFG. CO., Dept. PS-10, 1108 Jackson St., Omaha 2, Nebr.



Discharges tear gas to instantly stop, stun and incapacitate the most vicious man or beast. Effective substitute for firearms; leaves no permanent injury. No selling experience needed. Handle as profitable sideline, soon you'll sell it full time. Start now! Send \$5.95 for demonstration kit of Automatic Tear Gas Pencil. 10 demonstrators and 3 Tear Gas Cartridges. NOT SOLD TO MINORS, nor in Mich., Calif. or N. Y. State age with order.

HAGEN SUPPLY CORP., Dept. P100, St. Paul 1, Minn.

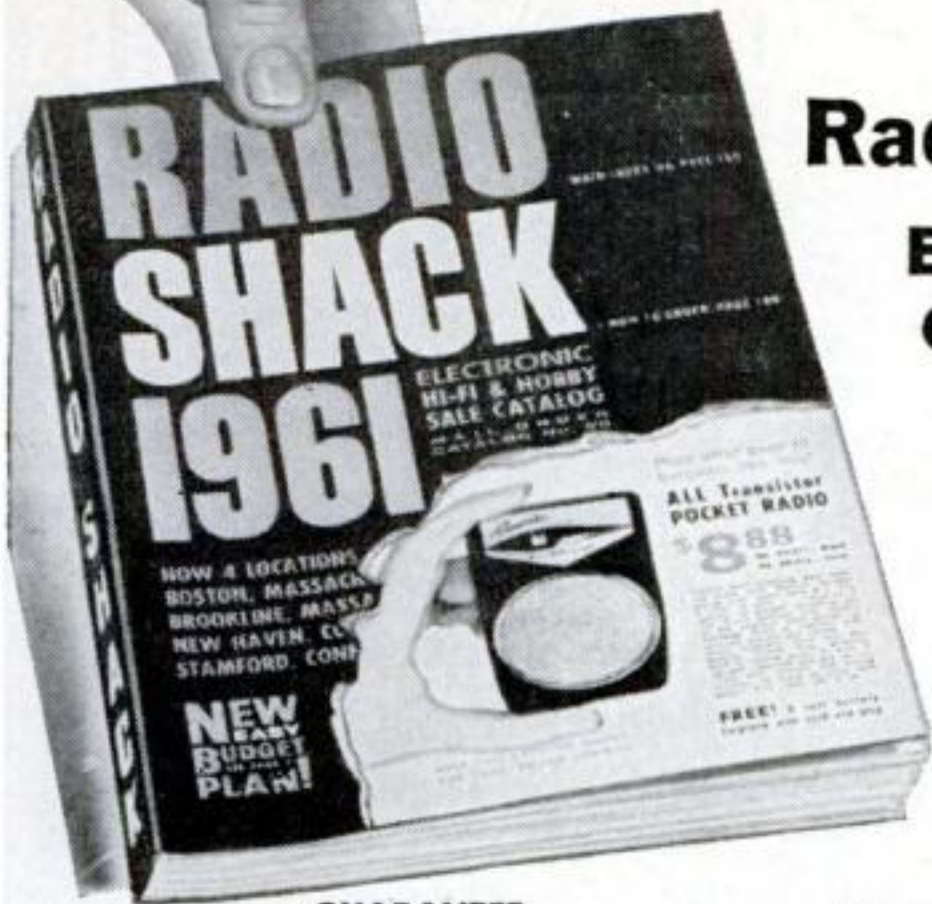
BIG PROFITS, SELLS EASY TO GAS STATIONS NIGHT WORKERS MOTORISTS, NURSES, STORES, BANKS, HOMES

Don't miss it! A million have sent for it already!

Send for your copy of
**Radio Shack's New 1961
Electronics CATALOG** **FREE**

Plus a full year's **FREE SUBSCRIPTION**
to all other Radio Shack Catalogs

- Save up to 50% on the latest and best in electronics: Stereo, Hi-Fi, Ham Radio, Transistors, Test Equipment, Kits and Parts. Over 100,000 items!
- Pay on Radio Shack's Easy Budget Plan—Lowest terms ever! Or open a Monthly Charge Account.



GUARANTEE

Radio Shack guarantees your absolute satisfaction or your money back. 15-day no-risk home trial on any item you order.

RADIO SHACK CORP.

730 Commonwealth Ave. Boston 17, Massachusetts

**Mail
Coupon
Now**

RADIO SHACK CORP. Dept. 60K4
730 Commonwealth Ave., Boston 17, Mass.
Without obligation, send latest giant Electronics Catalog plus every new issue for 1 year, free and postpaid.
Name _____
Address _____
Post Office _____
or City _____ Zone _____ State _____

See Page 61 for
Home Improvement
Holiday Contest.

**\$1,000
PUTS YOU IN BUSINESS
with this "Soft Ice Creamobile"**



EARN \$8,000 TO \$12,000 A YEAR

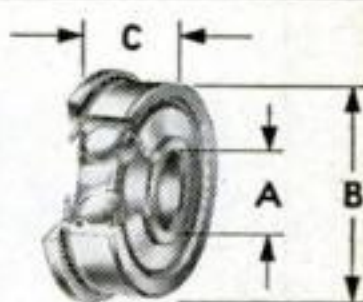
World's lowest priced soft ice cream mobile unit. \$8500 FULLY EQUIPPED. We train you quickly. Financed over long period. No payments until spring. This is your great opportunity to get into a permanent, profitable business of your own. Backed by largest international soft ice cream chain.

WRITE WIRE PHONE

TASTEE-FREEZ MOBILE UNIT DIV., DEPT. P
2518 W. Montrose Ave., Chicago 18, Ill., Phone COrnellia 7-6500

Hobbyists

REPLACE
HIGH-FRICTION BUSHINGS
WITH
MINIATURE BALL BEARINGS



First Time Offered to Model Builders — Miniature Ball Bearings to take 3/32", 1/8", 3/16" or 1/4" shafts:

Bearing Number	Dimensions		
	A	B	C
359	3/32"	5/16"	9/64"
159	1/8"	5/16"	9/64"
331	3/16"	3/8"	1/8"
113	1/4"	1/2"	3/16"

Reduce Power Loss! Increase Speed, Efficiency! Easy rotation — low friction — long life — lubricated — equipped with dirt shields also flange for easy installation. Titan • Atlas • Sidewinder and other missiles using millions of same bearings in Guidance and Control. \$4.00 ea. postpaid. 24-Hour Mail Service. Use Order Form Today!

SHIP:ea. #359ea. #331
.....ea. #159ea. #113

Send \$4.00 for each bearing ordered.

Name
Street
City Zone State
Enclose ☐ Check ☐ Money Order Amount

ADDRESS: Dept. PS-1

NEW HAMPSHIRE BALL BEARINGS, INC.
PETERBOROUGH, N. H.

FREE!

1961 LAFAYETTE ELECTRONICS CATALOG 610

From the world's leading supplier of electronics and stereo hi-fi equipment.

OUR 40TH YEAR

The biggest and best catalog in our history, featuring the latest equipment from all major manufacturers at prices that can't be beat anywhere.

**HUNDREDS OF EXCLUSIVE
LAFAYETTE FINE-QUALITY ITEMS
AVAILABLE IN THIS CATALOG ONLY**

The "complete shopping center" for the audiophile, hobbyist, technician, student, engineer, serviceman and dealer. Mail the coupon today for your free copy.

LAFAYETTE LOCATIONS

JAMAICA • BRONX • NEW YORK CITY
NEWARK • PLAINFIELD • PARAMUS • BOSTON

Lafayette Electronics

Dept. KJ-6

P.O. Box 190

Jamaica 31, N. Y.

Send me the **FREE** 324-pg. 1961 catalog 610.

Name.....

Address.....

City.....Zone.....State.....



MOVING WITH THE JOB?

Opportunity seekers find success the convenient, comfortable way in their Travel Trailers. Fully and smartly furnished, including showers, cooking facilities, your home on wheels adapts to any clime or site. Weatherized life-time construction, with conditioned air, gives you every home comfort, with ample storage space. Learn how to do it in **TRAILER TOPICS** the magazine of successful trailer living.

SPECIAL OFFER

4-month subscription... only

\$1.00



TRAILER TOPICS magazine

Suite 1519, 28 E. Jackson Blvd., Chicago 4, Ill.



BETTER THAN YOUR OWN SHOE STORE AT HOME!

Earn \$10.00 to \$50.00 weekly extra cash, with great Kushiontred Shoest! No experience or investment! Spare time only! Write for big **FREE** outfit!

TANNERS SHOE CO. • 737 Brockton, Mass.

EXCLUSIVE DOUBLE-BEARING HEAVY DUTY PUMPS



IRRIGATE • DRAIN • CIRCULATE • SPRAY

Use 1/4 HP motor or larger... 1 HP for up to 5,200 GPH; 1,000 GPH 60' high; or 3,000 GPH from 25' well, 1 1/4" inlet; 1" outlet. Stainless shaft. **TYPE X—2 oil-less \$10.95**

bronze bearings. Won't rust. **TYPE XB—Ball bearing model. \$12.95**

Best for belt drives.

Postpaid if cash with order.

Don't delay—send for yours today!

MONEY BACK GUARANTEE

Centrifugal and Gear Pumps in All Sizes

LABAWCO PUMPS, Belle Mead 4, N. J.

"My selling time actually shows me a profit of

\$20 TO \$25 AN HOUR

with Science's New Midget Miracle, the
PRESTO Fire Extinguisher

says M. R. Stanley of Calif.
Many others "cleaning up"
... so can YOU!



This is an amazing new kind of fire extinguisher. Tiny "Presto" M. R. STANLEY

(about the size of a flashlight) does job of bulky extinguishers that cost 4 times as much, and are 8 times as heavy. Ends fires fast as 2 seconds. Fits in palm of hand. Never corrodes. Guaranteed for 20 years! Sells for only \$4.95.

Show it to civil defense workers, owners of homes, cars, boats, farms, etc. and to stores for resale—make good income. C. S. Melious made \$175.00 in just five days. C. Kama, \$1,000.00 a month. Write now for **FREE** sales Kit. No obligation.



Science's New
Midget Miracle
—"PRESTO"

MERLITE INDUSTRIES, INC., Dept. P-16U

Presto Div., 114 East 32nd St., New York 16, N.Y.

IN CANADA: Mopa Co., Ltd., 871 Dowd St., Montreal 1, P.Q.

HELP STOP DEATH ON THE HIGHWAY



WHERE TRAFFIC LAWS ARE OBEYED DEATHS GO DOWN!

SUPPORT YOUR LOCAL SAFETY ORGANIZATION

Published as a public service in
cooperation with The Advertising Council

Shrinks Hemorrhoids New Way Without Surgery Stops Itch—Relieves Pain

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain—without surgery.

In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all—results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne*)—discovery of a world-famous research institute.

This substance is now available in *suppository* or *ointment* form under the name *Preparation H*.* Ask for it at all drug counters—money back guarantee. *Reg. U.S. Pat. Off.



Print Your Own

Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

Own a Printing Business

Print for Others, Good Profit. Have home shop. Junior press \$15; Senior \$29 up. We supply everything. Easy rules. Pays for self in short time. Write now for free details.

KELSEY PRESSES, 2-33 Meriden, Conn.

BAND SAW REPAIRS

Do It Yourself with this new Kit which will help you extend the life of your Saw Blades. Kit contains a strong Jig—Easyflow Solder and Flux, enough to repair 6 Blades, together with Easy to follow instructions. **Only \$2.25 postpaid.** (\$.10 extra West of Rockies.) Refill Solder and Flux \$1.00 ppd. Check or money order only.

WILLIAM FIEDLER, 1121 Lehigh Street, Allentown, Pa.



FREE

MUSCLE BUILDING INFORMATION

Sensational New Methods

Less Time—Less Effort—Better results

BODY-TONE, Box 638-E, North Miami 61, Fla.

"MADE \$1200 ON ONE JOB"

Some make more, some less...

We help you start Your Own All-Year Business

Make BIG Money! With our easily operated, highly efficient wall washer, G. H. Jones made \$1200 on one school job. E. L. Goss took in more than \$10,000 in one year.

E. C. Taber wrote, "I made \$400 gross in two weeks." And no wonder...this machine washes walls 6 times faster and better than by hand—with no mess...no drop cloths.

Your Money-Making Opportunity • We want more men to go into this profitable business for themselves and enjoy independence—freedom from layoffs and bosses. Customers everywhere—homes, offices, schools, churches, hotels, etc. How much you earn depends largely on you. What you take in is mostly profit. No need to rent shop or office; operate from home. Start spare time until full time is justified.

Lose No Time — Send Coupon Today for All the Facts

FREE BOOK! MAIL COUPON TODAY!

VON SCHRADER MFG. CO.

N11 "W" Pl., Racine, Wisconsin

Send at once (no obligation) your **FREE** booklet containing information about your **WALL WASHING MACHINE** and how I can start my own permanent, profitable business.

Name _____

Address _____

City _____ Zone _____ State _____

.308 WINCHESTER CALIBER

SPORTING RIFLE

\$24.95 with adjustable open sights



**.308 WINCHESTER SPORTER
WITH 4 POWER SCOPE
\$29.95** complete!

SURPLUS SCOPE purchase allows us to make this fantastic offer! We have picked up just a few hundred of these 4X color corrected scopes (adjustable for windage and elevation) at an inventory clearance. We mount and boresight at our cost with purchase of rifle.

**NEW NATO HIGH
VELOCITY CALIBER**

SPECIAL CLOSEOUT PURCHASE! Our gunsmith customizes this superb European rifle, converts prime walnut stock to sporter contours, lightens, rounds forestock, installs swivels, rebeds, headspaces, testfires. .308 Winchester is the official NEW NATO caliber, sporting and target ammo available at all sporting goods stores. Add \$4 per rifle for selected collector's grade exterior.

SPECIFICATIONS: Lightening fast 5-shot bolt action, box magazine fed, 22" bbl., sharp, accurate bores, rear sight adjustable for elevation and windage, all milled parts. \$75 value.

ACCESSORIES AND AMMO: .308 softpoint hunting ammo: 20 rds., \$2.95. Leather sling, \$2. Cleaning rod, \$1. Gun case, heavy duty, \$2. Cleaning kit, (patches, bore cleaner, gun oil) 75c.

TO ORDER: Enclose check, cash or money order. \$10 deposit for C.O.D. Shipped F.O.B. Culver City. 10-day money back guarantee. Calif. resid. add 4% state tax.

MARTIN B. RETTING, INC.

11029 Washington Blvd., Culver City 40, Calif.

Dr. Grabow Pre-Smoked PIPES

Only Dr. Grabow pipes
are mechanically pre-
smoked with fine
tobacco. Need no
breaking-in.
Sweet and cool
from the
first puff.



Viscount
\$5.

Others to \$10.
Imported Briar

For Free Booklet Write:
Dr. Grabow Pre-Smoked
Pipes • Greensboro, N.C.

BUILD, FLY YOUR OWN COPTER!



Easy to build, inexpensive, simple to fly.
Order 3-view drawings, specs, photo of
Glider \$1 or motor powered Gyro-Copter
\$2. Factory kits available.

BENSEN AIRCRAFT CORP., Dept. PS-100
Raleigh-Durham Airport, Raleigh, N. C.

NAME _____

ADDRESS _____

WANTED!

Mechanically Inclined
Men to Qualify for
BIG PAY JOBS
AND SPECIAL FACTORY
TRAINING IN DIESEL



"We need qualified repairmen, operators, mechanics
NOW!", say Diesel Manufacturers, Highway Build-
ers, Truck Line Operators in every corner of America.
Can you qualify for these High Pay Jobs? We can
help you! Interstate's General Course and Cummins-
approved Diesel home-training courses are interna-
tionally recognized. Advisory placement service for
trainees. Don't wait. Men are needed NOW!

Get the Facts Today!

WRITE INTERSTATE TRAINING SERVICE

Dept. A-2, Portland 12, Oregon

Rush information on I.T.S. Diesel Courses, Special Factory
Training and Diesel Job Opportunities.

Name _____

Address _____

City _____ Zone _____ State _____

STEP ASIDE for NO MAN



LEARN KARATE... DEADLY DEFENSE

You can master Karate, the
world's most deadly form of
unarmed combat. In his new
fully illustrated booklet, 'KA-
RATE, Open Hand and Foot Fighting,' Bruce Tegner's
pictorial method enables you to learn: (1) Karate
striking methods, how to make lethal use of 13 parts
of your body; (2) Nerve centers, how to temporarily
paralyze your opponent; (3) Defense and attack meth-
ods. WALK WITH CONFIDENCE. Start today—

Send only \$2.98 to: **KARATE** Dept. 429
7471 Melrose Ave., Los Angeles 46, California

FALSE TEETH



New Plate Made From Your Old—
Returned AIR MAIL Same Day...

LOW AS
\$15.95

SEND FOR FREE INFORMATION on
new professional method that gives you
light, comfortable, natural-looking, perfect-fitting plate—
upper or lower— from your old, worn, broken, loose plate without an
impression. Work guaranteed. **SEND NO MONEY**—just send name,
address, we'll rush details without obligation. State if plates are loose.
TRU-GRIP DENTAL LAB., 127 N. Dearborn, Dept. 46, Chicago 2

FREE GUIDE Reveals 200 Ways to Make Extra Money

YOU can turn your spare hours into
cash (\$25 to \$100 a week)! Ask for *Free Subscription*
to *Opportunity Magazine*, nationwide guide to extra
cash for millions of men and women. Contains hints,
plans, hundreds of offers. No matter what your age,
experience, or occupation—write TODAY for next 5
issues FREE. Send no money—just your name.
OPPORTUNITY, 850 N. Dearborn, Dept. 173, Chicago 10, Ill.

When Writing to Advertisers Please Mention Popular Science



CAR OWNERS! Get More Power and Mileage



POW-R-TACH TRANSISTOR TACHOMETER

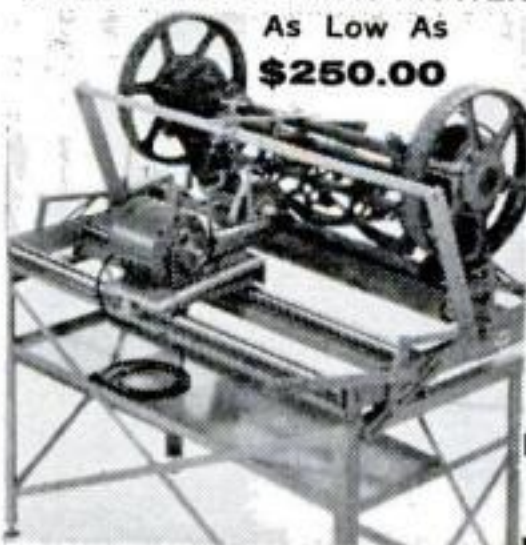
See exact speed ranges at which your
engine develops maximum power, fastest
acceleration, best gas mileage! Shows ex-
act R.P.M.'s from 0 to 8000. Indicates en-
gine's condition & performance at a glance
—warns when tuning or repairs needed.
Saves gas, oil, repairs! Complete with tach
dial (installs dash or steering column) &
transistorized sending kit (sub-assem-
bled). Easy instructions—installs in hour!
FULLY GUARANTEED. For all 4, 6, 8 Cyl.
cars. Specify car, year, no. of cyl., voltage.
COMPLETE TACHOMETER & KIT \$12.95 Postpaid
DELUXE ILLUMINATED TACHOMETER & KIT .. \$14.95 Postpaid
CUSTOM ILLUM. CHROME-FACE TACH & KIT \$16.95 Postpaid

\$30
Value
only **12.95**

ALMQUIST ENGINEERING, DEPT. PST10, MILFORD, PA.

MAKE EXTRA CASH

SHARPENING LAWN MOWERS THE MODERN WAY



As Low As
\$250.00

Start your own shop! Full or spare time. Earn many dollars in a short time... average \$5.00 per hour. Many mowers need sharpening. With MODERN'S Extra Heavy Duty LAWN MOWER SHARPENER AND BED KNIFE GRINDER you have 6 machines in one. All operations are done quickly and easily. You make money from the start. Write for free details.

MODERN MFG. CO.
160 N. Fair Oaks Ave. Dept.
Pasadena, California 11-5

ASTRONOMICAL REFLECTOR TELESCOPE PARTS!

**BIG NEW
64 PAGE
CATALOG
50¢**
(refundable
on
first order,
\$5 or more)



Before you buy telescopes... Know telescopes! Our BIG 64 page catalog shows you every part and accessory imaginable including mirror kits, our famous line of complete TRECKER telescopes, various models of refractor telescopes... also microscopes, riflescopes, spotting scopes, etc. Largest selection of books on Astronomy. Interesting and informative, explains what's really important... **POWER or RESOLUTION** in your telescope! Don't delay, send 50¢ now for this information-packed catalog from the nation's foremost telescope manufacturer, Est. 1933.

COAST INSTRUMENT, INC.
Dept. O. 4811 Long Beach Blvd., Long Beach 5, Calif.



CLOSE-OUT!

SUPERSENSITIVE RADIO KIT

It's fun & easy to build. Simple construction. The Magic Wand loopstick tuner is supersensitive. Radar type diode and earphone included. Other low price kits available. Write for Bulletin PS-1

3.50

PARTS UNLIMITED INC. 1 State St. Bloomfield, N. J.



SPOOK STUFF HALLOWE'EN LP ALBUM

Weird groans, moaning winds, clanking chains and creaking stairs; spooky sounds for party fun, first time ever offered—a 12" LP album with 40 min. of "haunting" sounds. Send \$4.98 check or money order. MP-TV Services, Dept. PS, 7000 Santa Monica Blvd., Hollywood, Calif.

SAVE ON NEW FAMOUS BRAND GUITARS

Direct from Wholesaler-to-You

... Low Discount Prices!

5-DAY FREE TRIAL

Easy Terms!



OVER 100

Models for students and professionals... yours at **BIG DISCOUNTS!** All nationally advertised makes... finest quality, Regular or Electric! E-Z Terms. Both Spanish, Hawaiian and Cutaway models. Low as \$19.95 up to \$240 for glorious professional models. Try before you buy on No-Risk 5-Day Free Trial Plan. Terms low as \$5 down; balance \$1 per week!

FREE Home Study Lesson Course
Get our low discount prices before you buy! Extra discounts on mandolins, ukas and banjos; amplifiers and pick ups. **Money back guarantee.** Rush coupon today!

**FREE
BONUS
GIFTS**

GUITAR WORLD, Dept. P-100
2003 W. Chicago Ave., Chicago 22, Ill.

GUITAR WORLD, Dept. P-100
2003 W. Chicago Ave., Chicago 22, Ill.

Rush free Color Catalog and Discount Prices.

**Free
Color
Catalog—
Discount
Prices**

Name.....

Address.....

City..... Zone..... State.....

COMPLETE WORKSHOP IN ONE TOOL!!!

IMPROVED GEARED Plierench

10 to 1 Gear Ratio

One Ton Gripping Power!

No home owner, mechanic, car owner or farmer can afford to be without this tool of a thousand uses. It's a powerful ratchet wrench, gripping edges and curved as well as flat surfaces. It's a wire-cutter. It's an Internal-External Pipe and Tube wrench securely gripping up to 2" O.D. It replaces complete sets of socket and open end wrenches, as well as all pliers. It is a monkey wrench—and because of its parallel jaws and lock-grip, is a perfect portable vise. Special gear transmission permits instant adjustment to any size. A precision tool, unconditionally guaranteed. Used by U. S. Army, Navy, Air Force, Coast Guard. **STANDARD KIT** consisting of 4 interchangeable jaws, including Universal Jaw; Utility-Pipe Jaw, Giant Utility Pipe Jaw; Giant Internal-External Jaw;—in handy pouch... all for \$9.98. Satisfaction guaranteed or money refunded. Use coupon below to order:



**only
\$9.98**

for Complete
Standard
Kit



American Specialty Co.

Dept. PSM-106, 4615 N. Ravenswood • Chicago 40, Ill.

Please ship me _____ Improved Plierench **STANDARD KIT** on your Satisfaction or Money Back Guarantee.

- ☐ I enclose \$9.98 (Check or M.O.) Send Postpaid.
☐ Send C.O.D.—I will pay \$9.98 plus postage, C.O.D. fee.
☐ Charge to Diners Club No. _____

Name _____ (Print)

Address _____

City _____ Zone _____ State _____



great glue for every job you do

For Free copy of "Elmer's Guide to Good Gluing" send stamped, self-addressed envelope to Borden Company, PS100, 350 Madison Avenue, New York 17, N. Y.

BORDEN'S PRODUCTS FOR THE HOME HANDYMAN



PAY 2 or 3¢ on the DOLLAR for 1000's of Useful Items of U.S. GOV'T SURPLUS

AT THE AMAZING PRICES PAID AT GOV'T SURPLUS SALES

Autos.....\$78	Tractors . . \$68
Trucks .....\$212	Motors... . \$99c
Boats.....\$5.90	Typewriters..\$6.80
Compressors..\$9.69	Generators . \$8.78

You BUY DIRECT from U. S. Government at TREMENDOUS savings. Eliminate middlemen—Save BIG MONEY! Pay as LOW as 2¢ on the dollar. Our DIRECTORY Gov't Surplus Sales lists 100's Army, Navy, Air Force Surplus Depots all over the world. BUY JEEPS, sports equipment, hunting, fishing and photographic equipment and supplies, radio, electronic and electrical equipment, trucks, boats, airplanes. Plumbing, hardware, office equipment & supplies. Tools, machinery, furniture. This 1960 book tells how to buy Gov't Surplus DIRECT. No dealer profits to pay. Get on the gravy train NOW! Send \$1 TODAY for "Gov't Surplus DIRECTORY" to AVIATION SURPLUS, Dept. PS-10, Box 789, York, Pa.

MAKE MONEY

Repair HYDRAULIC JACKS

EARN UP TO \$5 AN HOUR IN YOUR OWN BUSINESS

Start your own profitable business in the competition-free field of Hydraulic Jack Repair. EARN WHILE YOU LEARN! Work full or part-time from your own basement or garage. Millions of jacks in gas and auto service stations, body shops, truckers, riggers, factories, farms, need servicing.

We show you HOW.
Start NOW!

THESE BASIC MANUALS CAN BE YOUR KEY TO SUCCESS!

All you need to know to start right in repairing jacks. Easy, step-by-step directions, what tools to use, how to start your own business.

WRITE FOR FOLDER No. PS-10 AND FREE BONUS OFFER



INSTITUTE OF HYDRAULIC JACK REPAIR

P.O. BOX 50 • BLOOMFIELD, N. J.

A Correspondence School Licensed by N. J. Board of Education

OWN a BUSINESS!

Earn \$8,750.00 your First Year

Start part-time if employed. You'll be trained by a nearby dealer and at 5-day training school. As carpet-upholstery cleaning expert, you provide 6 services to multiply profits and customer satisfaction. No shop needed. Just 2 average jobs a day nets \$8,750 first year. We help build your business with 27 continuous services: counseling, nat'l advertising (McCall's, Parents, House Beautiful, others), newspaper ads mats, etc. Send for FREE booklets. DURACLEAN CO., 0-180 Duraclean Bldg., DEERFIELD, ILLINOIS

High School at Home

MANY FINISH IN 2 YEARS

No classes. No time wasted going to and from school. Progress as fast as your time and abilities permit. Standard H. S. texts supplied. Thousands enroll each year in this 63-year-old school. Send for FREE descriptive booklet.

AMERICAN SCHOOL, Dept. H746

Drexel at 58th St., Chicago 37, Ill.

Without obligation, please send FREE descriptive booklet.

Name.....

Address.....

Accredited Member National Home Study Council

WHAM-O BLOWGUN SET for target and hunting

This amazing gun has accuracy like a rifle. Compression of breath in barrel gives terrific air power. You won't believe your eyes!

3 FT. BARREL
5" steel darts
WILL GO THRU 1/4" PLYWOOD
Can shoot over 150 ft.
Average person can hit a 2" bullseye at 30 ft. Excellent for shooting small game. For target fun with friends, set up in patio or den. Set includes four 5" steel darts, 4 suction-cup target darts, range target. Extra set 10 darts \$1.
Satisfaction guaranteed. At sports dealers or send 1.98 to:
WHAM-O MFG. CO., Box H-10, San Gabriel, California

SPECIAL
\$1.98
postp.d.



BARBELLS

140-Pound, CHROME DELUXE Barbell-Dumbbell set only \$19.80.

This is our feature set and is the finest ever manufactured. Training with adjustable weight is the BEST way to keep fit; the ONLY way to develop great strength and a perfect body. As the oldest and best equipped barbell company, BUR gives value and prices no one can equal.

SEND FOR FREE CATALOG.

BUR BARBELL CO.

Lyndhurst 5, New Jersey

OIL LEASES

Many now enjoy "Second Incomes" from Oil Leases up to \$100.00 per day plus Big Bonus payments. Let me tell you how you can be an Oil Lease owner that may mean financial security to you.

CHAS. W. CRADER, P. O. Box 867-PS
Fort Worth 1, Texas

.38 SCOTLAND YARD SPECIAL



Amazingly accurate, this powerful .38 S & W 6-shot Enfield Revolver was used by Britain's secret agents & WW II Commandos when a small, compact weapon was essential. Has light recoil, this snub nose model features thumbrest target grip, fires easy-to-get S & W ammo. Good Cond. \$16.95. Selected models add \$3. 25 rds. .38 ammo \$1.80, holster \$3.95. Genuine double lock police handcuffs, chrome finish with 2 keys . . . \$5.75. Shipped FOB, L.A.; express charges collect. Calif. res. add 4% state tax. 10-day money back guarantee. Send cash, check, or M.O. COD's require \$8 deposit.

Seaport Traders, Inc., Dept. PS-10, 1221 S. Grand, Los Angeles 15, Calif.

THE 1960 POPULAR SCIENCE



"HOME IMPROVEMENT HOLIDAY" CONTEST !! YOU CAN ENTER NOW!

CONTEST RULES:

1

Submit a brief description (not to exceed 50 words) and a photograph or sketch of any home improvement project completed on your home between December 1st, 1958 and November 30th, 1960, when the contest closes. All projects completed within the specified two year period are eligible, whether you did the job yourself or not, however, the written contest entry itself must be your own work submitted in your name. The project must have been completed while you were the occupant of the home or apartment. Use the official entry blank below. The name and address of your local Building Supply or Hardware dealer *must be filled in* on the blank or the entry is void.

2

All entries will be judged by The Bruce, Richards Corporation, an independent judging organization, according to how well the project answered a specific requirement and the project's overall inventiveness. All projects are eligible no matter how small. Writing ability and quality of the photograph or sketch are not significant.

3

Prizes will be awarded on the basis of retail value. Only one prize to a family. Trip prize must be taken before Dec. 31, 1961. Judges' decisions are final. In the event of ties, duplicate prizes will be awarded. All entries and contents become the property of Popular Science Publishing Company, and none will be returned. Winners will be notified by mail and a complete list of winners will be published in POPULAR SCIENCE Monthly.

4

This contest is open to anyone in the United States and Canada, except employees of Popular Science Publishing Co., and their families, and its advertising agency.

ENTRY BLANK

All entries must be post marked by midnight, November 30th, 1960 and received by December 9, 1960.

Remember to attach your project photograph or sketch on separate sheet of paper!

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Your Building Supply or Hardware Dealer is:

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

(Use separate paper with coupon attached if extra space is needed.)

(o)

Contest subject to federal, state and local regulations.

Mail entries to:

Home Improvement Holiday Contest
Box #600 New York 46, New York

SEE NEXT PAGE FOR VALUABLE PRIZES →

WIN·WIN·WIN·WIN·WIN!



GRAND PRIZE

ROUND TRIP TO RIO VIA VARIG JET

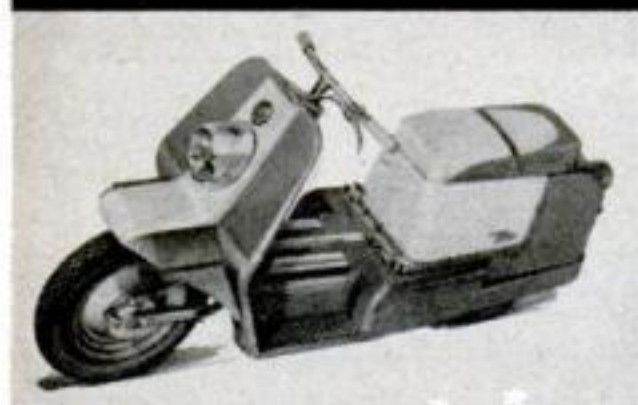
A fabulous seven day holiday for two in glamorous Rio de Janeiro, Brazil via Varig. Winners will be guests of the plush Hotel Gloria—round trip jet fares from New York — hotel, meals, sight-seeing trips.



FIRST PRIZE

LARK SEDAN

Step out in front with the STUDEBAKER LARK. Here's the 2-door sedan All America wants... and it can be yours. For economy of operation, for ease of performance, for features that put you far out front — it's the LARK!



2 HARLEY-DAVIDSON "TOPPER" SCOOTERS

HARLEY - DAVIDSON "TOPPER" Scooter, the model with the trim styling exterior design and top mechanical features. Get up to 80 miles per gallon or more... it's easy to drive, economical to run. Another outstanding design by HARLEY-DAVIDSON.



2 DeVRY SCHOLARSHIPS

Two DeVRY Tech Scholarships in Electronics for 2 lucky winners. Your choice of 36-weeks tuition-free training in the Chicago or Toronto Laboratories, or a complete home study program. Competent, experienced instructors are just one reason why DeVRY graduates do so well in the electronic field.



2 STANLEY TOOL ASSORTMENTS

Here's the opportunity to have the tools you've always wanted. Make your own selection from the STANLEY HAND TOOL and STANLEY ELECTRIC TOOL Catalogs. Select \$250. worth in hand tools, \$250. worth in electric tools by STANLEY!

◀ SEE PRECEDING PAGE FOR ENTRY BLANK

500 FABULOUS PRIZES



4 SETS OF ENCYCLOPEDIA BRITANNICA

The world's greatest treasure house of knowledge. Equivalent to a library of 1,000 books. The Encyclopedia Britannica is virtually essential in every home where education is valued and respected.



5 SHOPMATE RADIAL ARM SAWS
SHOPMATE New Radial Arm 7" Saw brings you all the cuts and accuracy of a radial saw plus the flexibility of a portable saw. It features simple, practical and accurate adjustments, with a crosscut capacity of 16" on 1" board, a rip cut capacity of 25½" outboard!

8 BLACK & DECKER ¾ H.P. HEAVY DUTY ROUTERS

BLACK & DECKER brings you the fast, accurate, powerful ¾ H.P. Heavy-Duty Router. It's the most versatile of woodworking tools, assuring professional results. This complete kit by BLACK & DECKER features 6 of the most popular and useful bits.



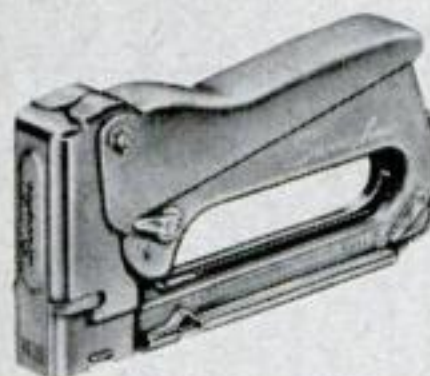
75 BERNZOMATIC CARRY-ALL TORCH KITS

BERNZOMATIC brings you their famous Propane Torch Kit complete with an all-purpose metal carrying case. It includes cylinder, pencil burner unit, utility burner head, soldering tip, flame spreader and flint spark-lighter. It's ready for action anywhere.



20 PORTER-CABLE SANDERS

Here's the PORTER-CABLE Finishing Sander for star performance! Orbital motion lets you produce professional results on all sanding jobs. Motor-driven, exclusive gear transmission, simple abrasive changes, perfectly balanced and lightweight—just a few of the features in this PORTER-CABLE Sander.



150 SWINGLINE STAPLE GUNS

High-compression Staple Gun, with exclusive built-in staple extractor. It's a favorite home tool by the world's largest manufacturer of staplers for home and office.

50 SOUTHERN SCREW "DO-IT-YOURSELF" PACKAGES

For the do-it-yourselfer SOUTHERN SCREW COMPANY makes-up a "package" of wood screws, sheet metal screws and stove bolts in varied sizes. It's the handyman's "help yourself" kit... with SOUTHERN's accent on quality.



100 WHITE LUFKIN STEEL TAPES

This Banner Tape is the first choice of artisans in every building trade. Home-owners, too, will appreciate the quality features of Lufkin Tapes. It's easy to read, easy to handle—a "must" for every craftsman.



4 SETS OF VANDERBILT TIRES

Set of four (4) V-120 Premium VANDERBILT TIRES, Now Seven-Ribbed Safety Tread; Built-in Grip Selector! Your Choice: Tubeless, Tube-Type, 100% Nylon, Miracle Tyrex Cord; Black & Whitewall.



200 RAY-O-VAC NITE HAWK HEADLITES

Your hands are always free with this RAY-O-VAC HAWK HEADLITE, complete with battery and belt carrying case. Whenever you need two hands ready, the RAY-O-VAC NITE HAWK HEADLITE becomes your indispensable companion for "the light touch".

50 SETS OF WOLVERINE BOOTS AND GLOVES

WOLVERINE presents "the perfect pair"... a pair of field boots, and a pair of work gloves. The WOLVERINE boots feature lightweight, waterproof construction... the gloves have built-in WOLVERINE wear-ability.



25 MILLERS FALLS #1144 Nylon Safe-T-Drills

An all new shock-proof drill housed in rugged DuPont Nylon... for modern all around use. Lightweight—plenty of high speed power for all drill work.



Contest prize arrangements by Marden-Kane, Inc.

HOME IMPROVEMENT HOLIDAY CONTEST HEADQUARTERS

For materials, advice, estimates, financing

CALIFORNIA

Arcadia Lumber Company
214 North Santa Anita Ave.
Arcadia
Hammond Lumber Company
205 E. Huntington Drive
Arcadia
Hammond Lumber Company
16307 S. Bellflower Blvd.
Bellflower
George C. Jacobs Company
60 West 4th Street
Eureka
Hammond Lumber Company
8791 Sierra Way
Fontana
Hammond Lumber Company
301 S. Arroyo Parkway
Pasadena
Hayward Lumber Co.
11 Abbott Street
Salinas
San Lorenzo Building Supply
15715 Hesperian Blvd.
San Lorenzo
Fisher Lumber Company
14th & Colorado Avenue
Santa Monica
Hansen Building Materials & Supplies
Corner Anthony and Taft Streets
Tranquillity
Hammond Lumber Company
616 Main Street
Venice
Hammond Lumber Company
13872 Harbor Blvd.
West Santa Ana
Rossman Mill & Lumber Co., Ltd.
P. O. Box 1235
Wilmington

COLORADO

United Lumber & Hardware
307 Bridge Street
Brighton
Morgan County Fed. S. & L. Assoc.
130 West Kiowa Avenue
Fort Morgan

CONNECTICUT

Burritt Building Materials, Inc.
415 Knowlton Street
Bridgeport
The Wm. G. Glenney Co.
336 No. Main Street
Manchester

FLORIDA

Bond-Howell Lumber Company
200 South Segrave
Daytona Beach
Causeway Lumber Company, Inc.
2627 S. Andrews Avenue
Ft. Lauderdale
Brooker Lumber Company
225 S.W. Second Avenue
Homestead
Ocala Lumber Company
1214 North Magnolia
Ocala
Leon Federal Savings & Loan Assoc.
111 South Monroe
Tallahassee

ILLINOIS

Edward Hines Lumber Company
5245 Archer Avenue
Chicago

Edward Hines Lumber Company
355 North Laverne Avenue
Chicago

Edward Hines Lumber Company
1168 North Halsted Street
Chicago

Edward Hines Lumber Company
3840 Milwaukee Avenue
Chicago

Edward Hines Lumber Company
5140 Milwaukee Avenue
Chicago

Edward Hines Lumber Company
3765 Lincoln Avenue
Chicago

Edward Hines Lumber Company
1834 Balmoral Avenue
Chicago

Edward Hines Lumber Company
4626 West 63rd Street
Chicago

Edward Hines Lumber Company
1620 West 59th Street
Chicago

Edward Hines Lumber Company
Main Yard Retail Store
2134 South Wolcott
Chicago

Joseph Lumber Company
2001 North Narragansett
Chicago

Joseph Lumber Company
3333 North Kimball Avenue
Chicago

Edward Hines Lumber Company
4901 West 25th Place
Cicero

Joseph Lumber Company
612 Waverly Court
Deerfield

Edward Hines Lumber Company
1597 Warren Avenue
Downers Grove

Edward Hines Lumber Company
1613 Church Street
Evanston

Edward Hines Lumber Company
119 Chicago Avenue
Evanston

Edward Hines Lumber Company
2601 West 95th Street
Evergreen Park

Freeburg Lumber Company
11 South State
Freeburg

Edward Hines Lumber Company
1030 Pine Avenue
Glenview

Edward Hines Lumber Company
1641 Oakwood Avenue
Highland Park

Edward Hines Lumber Company
18600 Harwood Avenue
Homewood

Edward Hines Lumber Company
309 West Irving Park
Itasca

Edward Hines Lumber Company
511 East Cossitt Street
La Grange

INR Beatty Lumber Company
324 Main Street
Marseilles

Edward Hines Lumber Company
2000 Main Street
Melrose Park

Litwiller Lumber & Grain Company
Milledgeville

Edward Hines Lumber Company
604 West Central Road
Mt. Prospect

INR Beatty Lumber Company
5167 West 95th Street
Oak Lawn

INR Beatty Lumber Company
9537 South 52nd Avenue
Oak Lawn

INR Beatty Lumber Company
9730 West 143rd Street
Orland Park

Edward Hines Lumber Company
7 South Hale Avenue
Palatine

Edward Hines Lumber Company
400 Busse Highway
Park Ridge

M. S. Carver Lumber Company
603 East War Memorial Drive
Peoria

Hazen & Franks, Inc.
Box 186
Philo

Edward Hines Lumber Company
7820 West Madison Street
River Forest

Edward Hines Lumber Company
101 North 1st Avenue
St. Charles

INR Beatty Lumber Company
6721 West North Street
Tinley Park

Edward Hines Lumber Company
127 Monterey Avenue
Villa Park

INDIANA

Dunlap & Company, Inc.
5th & Jackson Street
Columbus
Elkhart Lumber & Sawmill Co., Inc.
2100 Johnson Street
Elkhart
Central Lumber & Supply
8th & Pershing Sts.
Seymour

KANSAS

Davis Lumber Co.
732 East 1st Street
Hutchinson
Home Lumber Company
201 Grant Avenue
Junction City

LOUISIANA

Bolinger Lumber & Supply Co., Inc.
1603 Barksdale Blvd.
Bossier City

MARYLAND

Western Maryland Lumber & Sup. Co.
210 McMullen Highway
Cumberland
The Wm. D. Bowers Lumber Co.
231 East Patrick Street
Frederick

MASSACHUSETTS

Middlesex Lumber & Fuel, Inc.
Depot Square
Bedford
Knight Home Modernization Center
274 Cabot Street
Beverly
Chairtown Lumber Company
Gardner
Tessier Millwork & Lumber Company
11 Jackson Street
Holyoke

MINNESOTA

Paul Bunyan Building Supply Co.
518 West Washington Street
Brainerd
Kasson Lumber Company
Kasson
Crystal Lumber Company, Inc.
5353 Lakeland Avenue, N.
Minneapolis
Lampland Lumber Company
419 East 8th Street
St. Paul

MONTANA

Gallatin Lumber Company
237 West Main
Bozeman
Monarch Lumber Company
1005 8th Avenue, North
Great Falls

NEBRASKA

Johnson Cashway Lumber Co.
1820 R Street
Lincoln
Millard Lumber & Grain Co.
305 South Fifth Street
Millard
Field-Birge Company
101 West Front Street
North Platte

NEW YORK

Wm. B. Morse Lumber Company
340 Main Street, West
Rochester
Ronkonkoma Lumber Company, Inc.
15 Hawkins Avenue
Ronkonkoma
Kellogg Lumber, Inc.
Meadow Street
Utica

NORTH CAROLINA

First Federal Savings & Loan Assoc.
300 West Edgerton Street
Dunn
Coman Lumber Company
912 Ramseur Street
Durham
Cape Fear Supply Co.
319 West Russell Street
Fayetteville
Bridges Hardware Company, Inc.
Kings Mountain
Capitol City Lumber Company
Raleigh

OHIO

W. F. Rosser Lumber Co.
205 East Second Street
Arcanum
Belpre Building Materials Co.
1623 Washington Blvd.
Belpre
Broadway Lumber Company
8022 Broadway
Cleveland
Great Lakes Lumber Company
14110 Lorain Avenue
Cleveland
Preisler Lumber
2391 Woodhill Road
Cleveland
Elston Lumber
309 Lancaster
Marietta
Bennett Lumber Company
342 East Smith Road
Medina
The Niles Lumber & Supply Co.
46 East Church Street
Niles
Ottoville Lumber Company
620 Canal Street
Ottoville
Stewart J. McHugh Lumberteria, Inc.
7030 Montgomery Road
Selverton
McDowell Lumber Company
215 South 7th Street
Steubenville
Stephan Lumber Company
226 South Eighth Street
Upper Sandusky
Euclid Lumber Sales
30601 Euclid Avenue
Wickliffe

OKLAHOMA

Davidson & Case Lumber Company
Box 608
El Reno

Home Savings & Loan Assoc.
Box 377
Lawton
Lefler Home Improvement Co.
809 Leahy
Pawhuska

OREGON

George W. Borgen Building
Supplies
2701 Court Avenue
Baker
Van Petten Lumber
620 S. W. Dorian
Pendleton
J. W. Copeland Yards
520 Wallace Road
Salem
Progress Lumber Company
8880 S.W. Scholls Ferry Road
Tigard
Georgia-Pacific Corp.
Retail Department
Toledo

PENNSYLVANIA

Trexler Lumber Company
430 North 16th Street
Allentown
Seibert Lumber Store
Columbia Ave. at Eisenhower Blvd.
Lancaster
Mechanicsburg Lumber Co.
125 South Locust Street
Mechanicsburg
Arnold Lumber Company
1388 Fourth Avenue
New Kensington
Selinsgrove Savings & Loan Assoc.
5 North Market Street
Selinsgrove
Brosious Lumber
4th & Duke, Northumberland
330 North 2nd, Sunbury
Peter Lumber Company
6263 Oxford Avenue
Philadelphia
Schmoyer's Lumber Company
250 Main Street
Schwenksville
Johnson-Sizer Company
269 South Dock Avenue
Sharon
Merrett Lumber Yards, Inc.
Route 422
Stowe

SOUTH DAKOTA

Beresford Lumber Company
204 North 2nd Street
Beresford
Bachmayer Lumber Company
Faulkton
Flandreau Independent
Lumber Company
106 South Crescent
Flandreau
Mobridge Lumber Company
Mobridge
Schoeneman Brothers Company
305 East 8th Street
Sioux Falls
Scott Lumber & Supply Company
3008 E. 10th Street
Sioux Falls

TEXAS

Temple Lumber Company
201 South Walnut
Clarksville
Lamar Builders' Supply, Inc.
6611 North Lamar Blvd.
Austin
Del Rio Lumber Company
P. O. Box 933
Del Rio
Foxworth-Galbraith
Lumber Company
Box 1115
Dumas
Westhoff Merch. Company
Box 608
Edna
Lander Lumber Company, Inc.
P. O. Box 1442, El Paso
1830 Texas Avenue, El Paso
Chelmont Shopping Center, El Paso
Waples-Painter Company
30 West California Street
Gainesville
Maynor Lumber Company
6316 Mykawa Road
Houston

Tharp Lumber Company
P. O. Box 338
LaMarque

UTAH

Central Builders' Supply
Box 67
Orem
Bestway Building Center
P. O. Box 389
Salt Lake City
Smith Brothers Lumber Company
52 East Main
Hyrum

WASHINGTON

Manette Lumber Company
201 Shore Drive
Bremerton
Morgan Builders Supply, Inc.
521 North Palouse Avenue
Walla Walla
Todd Hardware Company
123 Pacific, Bremerton
312 North Callow, Bremerton
J. W. Mack Builders Material
706 Catlin Street
Kelso
J. W. Mack Builders Material
Longview
Lakeside Western Lumber
211 North First
Mt. Vernon
Lumberman's Merchandise Company
503 West 4th
Olympia
Bestway Building Center
205 South Fourth Street
Pasco
Lepley Lumber Company
1300 East Main
Puyallup
Nailor Lumber Company
118 East 8th
Port Angeles
Sand Point Builders Supply
6200 Sand Point Way
Seattle
Lumbermen's Mercantile Company
Shelton
Garland Lumber Company
W. 1104 Garland Avenue
Spokane

WEST VIRGINIA

Bailey Lumber Company
1118 Bluefield Avenue
Bluefield
Dunbar Lumber Company, Inc.
405 12th Street
Dunbar

WISCONSIN

Waupun Savings & Loan Association
101 South Madison Street
Waupun
Walker Lumber Company
Columbus
Elm Grove Fuel & Supply Corp.
13420 Watertown Plank Road
Elm Grove
Solie Lumber Company
937 South Jackson Street
Janesville
Capitol Lumber &
Hardware Company
400 West Capitol Drive
Milwaukee
Holt Lumber, Inc.
11700 West Silver Spring
Milwaukee
Krouskops, Inc.
Muscola
Lachmund Lumber Company
Sauk City
Vetter Mfg. Company
313 Wood Street
Stevens Point

CANADA

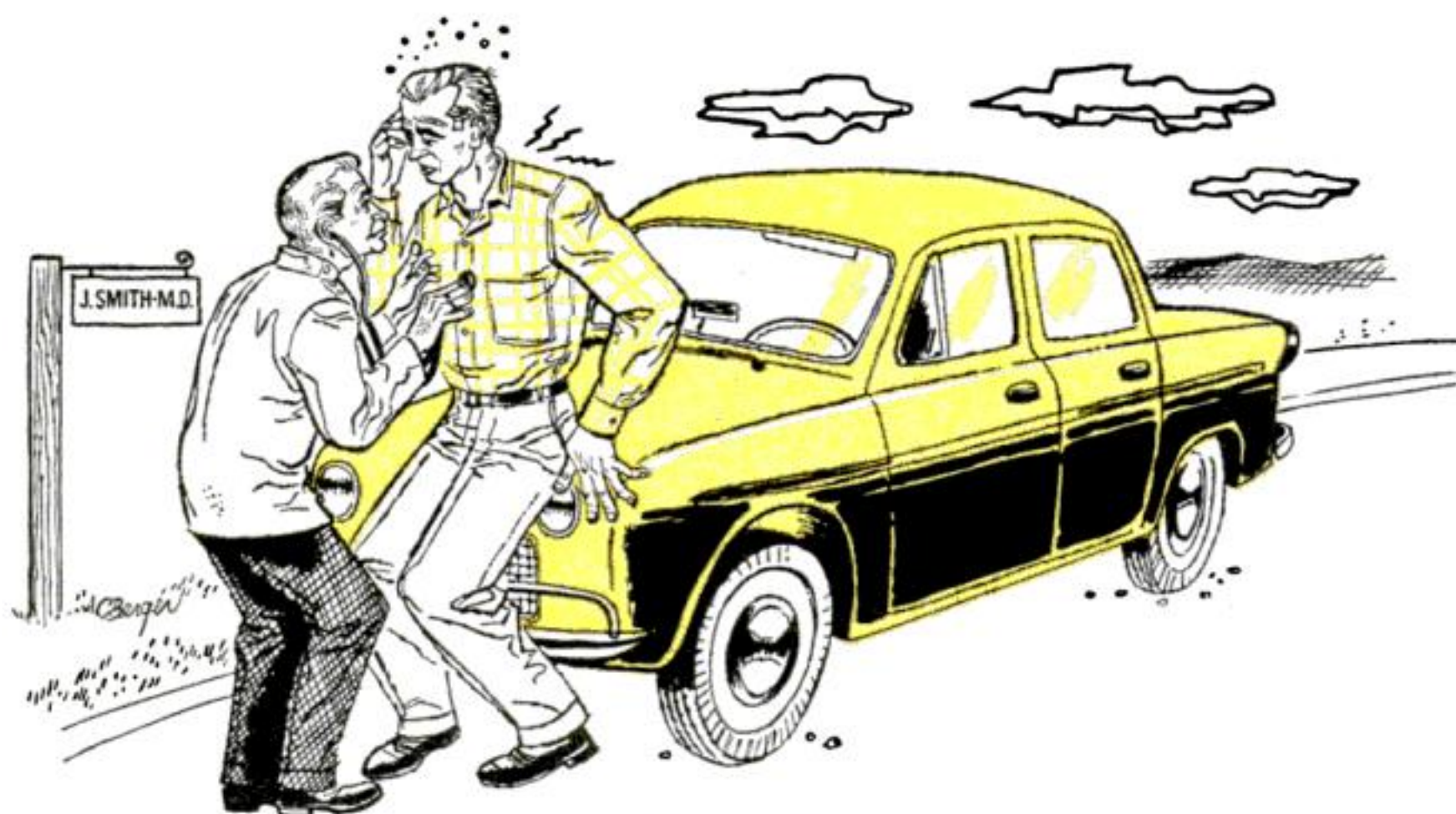
Rutherford Home Improvement
Centre
225 Atwater Avenue
Montreal, Que.
Reliance Lumber Company, Ltd.
629 2nd Avenue, North
Saskatoon, Sask.
Valley Lumber Yards, Ltd.
P. O. Drawer 520
New Westminster, B. C.

German Engine for Tiny Ford?

THE small Ford expected sometime in 1961 may use an engine, and possibly other drive components, made in Europe by Ford of Germany. The engine—planned, engineered, and now being tested in the U. S.—could be built in Germany

and shipped to this country at less cost than it could be made here, according to some sources. Ford is also considering a German-built transmission for the small car—which will compete in the VW-Renault-Anglia price-and-size range.

.....



Small-car aches and pains. The switch from a big car to a small one may cause bodily pain to a driver, warns Dr. J. F. Strauss Jr. of Chicago. Dr. Strauss recently has treated patients who had developed aches in the chest, hip, or back a day or two after the switch in cars.

The pains result from changes in driving positions and habits (shifting gears, perhaps), the doctor explained. The difficulties were not limited to six-footers; only one of his patients was over five-feet-ten. "Symptoms . . . may require as long as two or three weeks to subside," he adds.

.....

Recipe: stainless-steel engine. Take a batch of stainless stampings, add several cups of copper foil and wire, then bake in a 2,100-degree oven. Result? A lightweight, powerful, four-cylinder engine that develops up to one horsepower per pound and more than one horsepower per cubic inch.

The stainless-steel engine, developed by

Lloyd Taylor, designer of the postwar Crosley "Cobra" engine, features a combination cylinder block and head assembly—formed not by casting in the conventional way, but by welding and furnace-brazing together thin steel sheets. Since the steel sheets have a uniform wall thickness, "hot spots" caused by uneven metal concentrations don't occur. The thin


New! And looks it! If you've been waiting for your dream motor, wait no more. Evinrude's all new Starflite III is here. What does it offer? The might of 75 hp! The smoothness of a V-4 engine! The speed of Jetstream Drive! The quiet of sound-sealed, cushioned power!

New fixed-jet carburetion is combined, for the first time, with thermostat-controlled engine temperature for the ultimate in efficient, fool-proof performance. A new AC generator, with transistorized regulation, lets you enjoy all the latest electrical accessories with never a worry about battery drain.

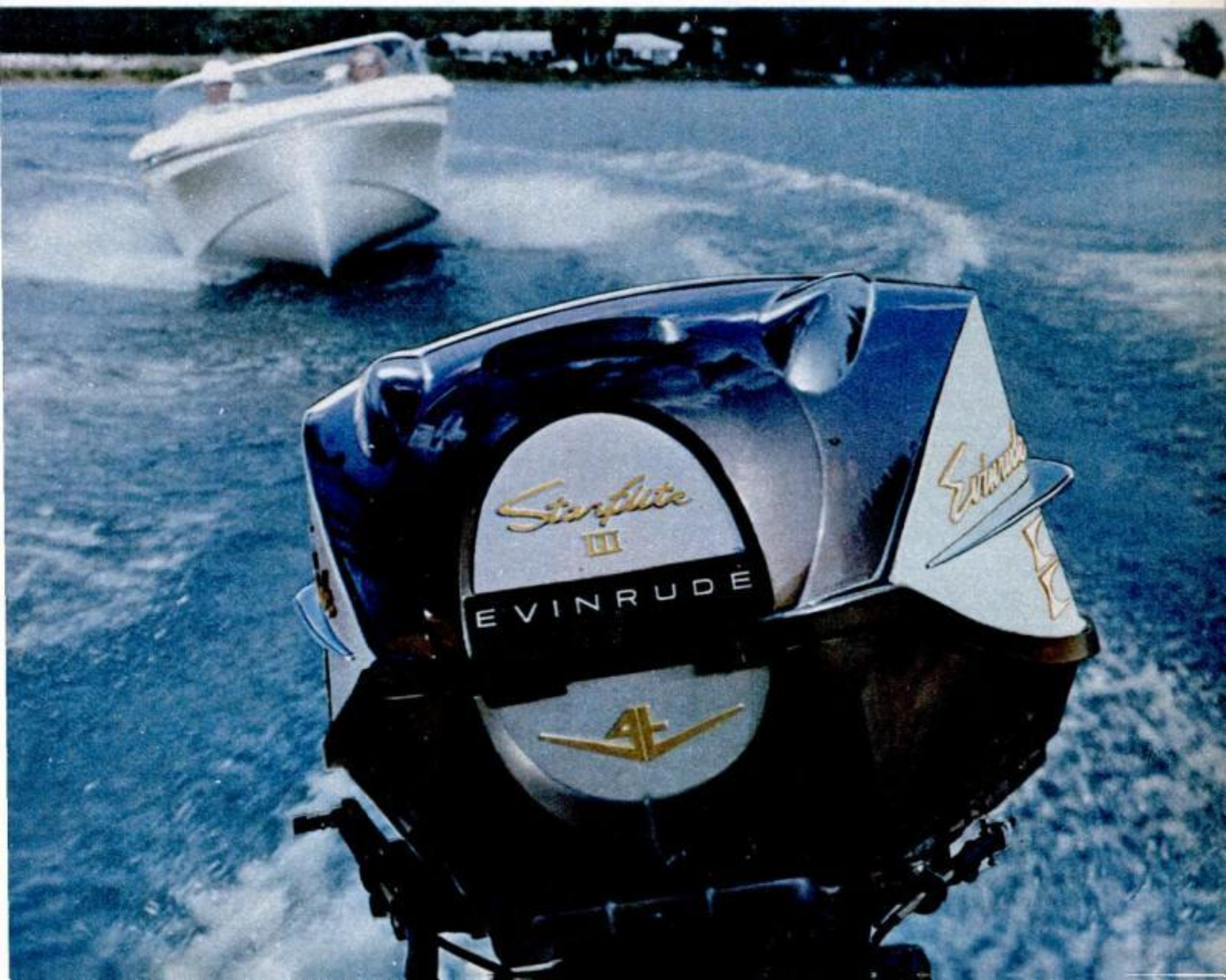
For 1961... Evinrude presents two brilliant Starflite models, a new, luxury-performing 40 hp Lark, the "big buy" 40 hp Big Twin, and four other models of efficiency from 3 to 18 hp.

Fall is your best time of all to drive a good boating bargain. See your Evinrude dealer now. Ask for your FREE 24-page 1961 catalog, or write: Evinrude Motors, 4018 N. 27th St., Milwaukee 16, Wis. (In Canada: Peterborough, Ont.) A Division of Outboard Marine Corp.

EVINRUDE

 FIRST IN OUTBOARDS

the new 1961
EVINRUDES
are out
.....in front!



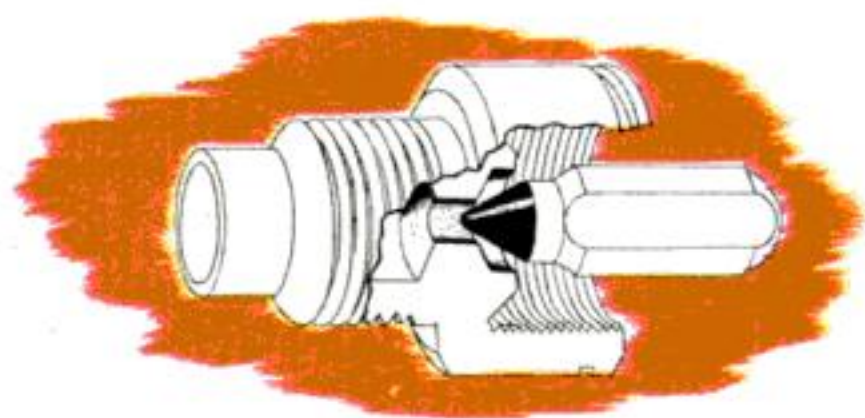
DETROIT REPORT continued

stampings dissipate heat more rapidly than thicker castings, reducing pre-ignition or "knock" and permitting very high compression ratios (12:1; 14:1 optional).

The engine, reportedly near production by Tyce Engineering Corp. in California, has dual overhead cams and can be made

in four displacement sizes merely by changing crankshafts. The 3½-inch bore stays the same. The four engine sizes and horsepower ratings are: 91 cu. in., 115 hp.; 105 cu. in., 125 hp.; 120 cu. in., 150 hp.; 135 cu. in., 175 hp. First installations will be in boats, sports cars, and race cars.

.....



Holding back the flood. A rubber-tipped needle valve that eliminates carburetor flooding caused by foreign material jamming the needle seat is being used on all 1961 Chrysler-built cars.

With conventional steel-tipped needle valves, a tiny particle wedged in the valve seat can prevent the valve from closing fully—and fuel trickles through, flooding the carburetor. The Chrysler rubber-tipped valve simply envelops small particles and closes firmly.

.....

Glass fuel tanks? The trucking industry's search for ways to increase payloads may pave the way for reinforced fiber-glass to replace steel in diesel-fuel and air-brake tanks on many over-the-road tractors. Fiber-glass tanks are much lighter: a 100-gallon model weighs less

than 70 lb., compared with steel's 160 lb.

Other advantages of fiber-glass tanks include high resistance to rupture under shock, resilience that minimizes failure caused by vibration-induced fatigue, and, because they are nonsparking and nonconductors of electricity, less fire hazard.

.....

California anti-smoggers (cont.). Detroit hopes to tone down cars-cause-smog complaints from Californians, if not smog itself, by installing fume-reducing crankcase breathers on all 1961 cars sold in the state.

The "emission reduction systems," their flossy official name, pull crankcase vapors (which otherwise would be discharged into the air as unburned hydrocarbons) into the intake manifold when manifold vacuum is low. Vapors then flow into the

cylinders and are burned. A valve restricts vapor flow at idle when it might make the fuel mixture too lean. The valve also restricts reverse flow of the blow-by gasses. The positive crankcase breathers have no effect on exhaust fumes, biggest source of hydrocarbons and other smog-producing gases.

In addition to being "mandatory options" on all California cars, the breathers will be standard equipment for some models, voluntary options for others.

.....

Now it's compact trucks. Ford's Falcon Ranchero pickup, introduced earlier this year, is just a sample of what's coming in trucks later this fall. Both Ford and Chevy are ready to hit the showrooms with a complete series of light trucks using engines, transmissions, and running gear

lifted whole from their compact cars.

Among the new lightweight haulers are pickups that can be loaded from the sides as easily as the rear, small vans, and handsome panel delivery vehicles. Low first cost, good fuel economy, and excellent maneuverability will be major selling points.

A new kind of cushion against wear and repair



DETROIT DEMANDS IT! KENDALL HAS IT!

Higher Quality Protection for Your High Performance Engine

Today's automotive engines are the most efficient in history. Built into them is the smoothest, quietest flow of power ever offered motorists. But, automotive engineers state that the continued enjoyment of these features *demand*s the protection of a motor oil above and beyond all former quality standards.

That is *exactly* what KENDALL SuperB MOTOR OIL offers you . . . increased protection for your greater driving pleasure.

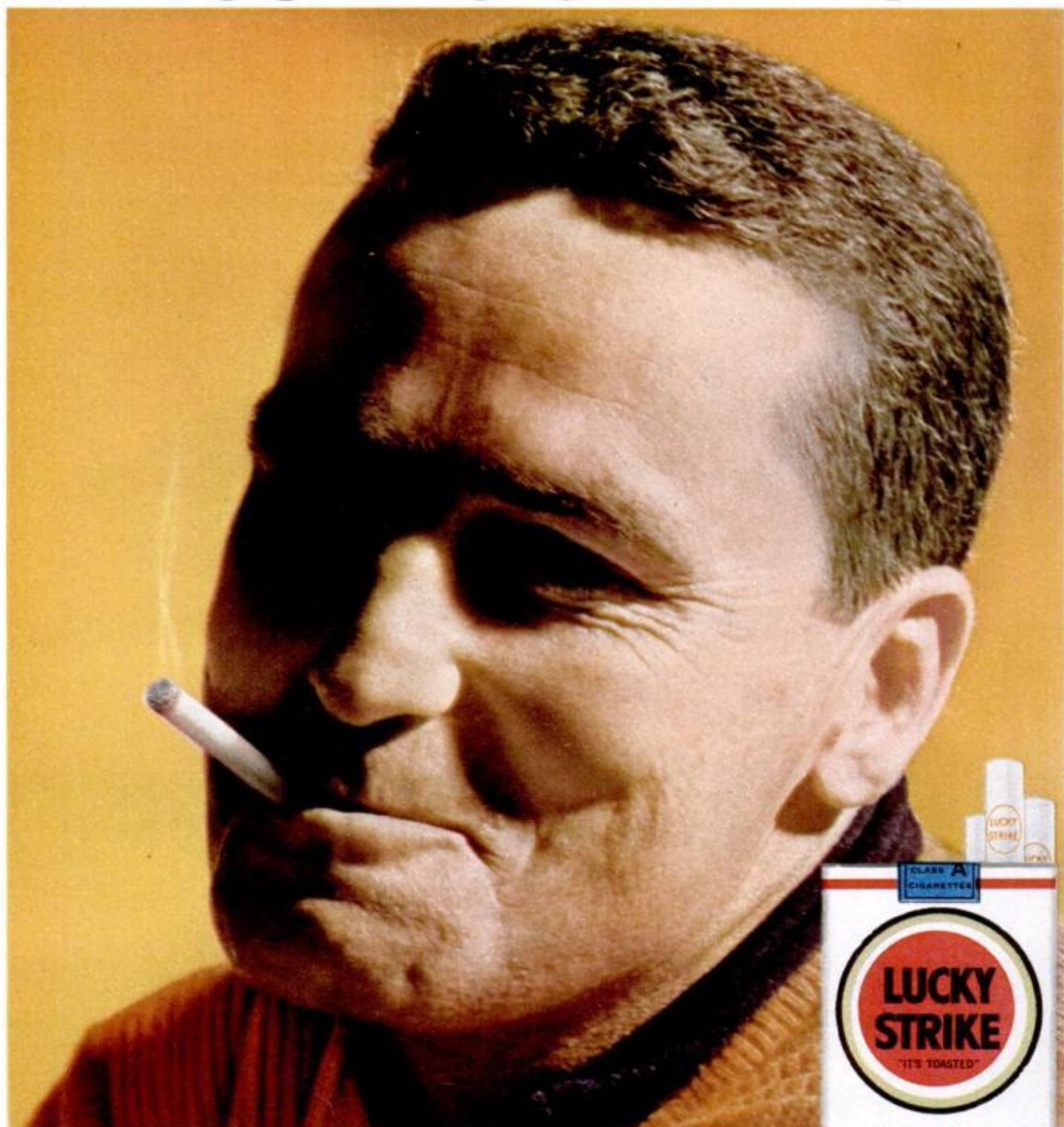
Refined from the richest 100% Pennsylvania Crude Oil, here is an all-weather motor oil that simultaneously solves combustion chamber deposits, valve lifter sticking, cold engine sludge

and hot engine varnish. By minimizing wear, it minimizes repair. The economy of its quality is further enhanced by giving you more miles per gallon of gasoline, too.

Since 1881 we've made quality our business. Never before have we offered with such pride a product like KENDALL SuperB. To keep your car running like new at less cost to you, ASK YOUR FAVORITE DEALER FOR IT. Kendall Refining Company, Bradford, Penna.



Remember how great cigarettes used to taste?
LUCKIES STILL DO



CHANGE TO LUCKIES

and get some taste for a change!

TOBACCO AND TASTE
TOO FINE TO FILTER

Again, compacts are the hot news—new makes, new models, a sizzling new V-8 engine...The big cars? Surprise—they're shrinking—but loaded with fresh gadgetry...On the following 24 pages, PS gives you the Big Picture for...

1961

new cars

Compacts come hot now. Spectacular performers are the BOP cars, the Corvair offspring for Buick, Oldsmobile, and Pontiac. Here's your first look at the Special, F-85, and Tempest.

PAGE 72

"Driving the Buick Special is a delight," says Devon Francis. He tells why in his exclusive report from the driver's seat.

PAGE 90

Dodge has a compact this year, too: Lancer.

PAGE 82

Big cars also make news—smaller outside but not inside, sprinkled with mechanical innovations.

PAGE 78

new engines

The BOP compacts are hot cars because they have brand-new V-8s—made of aluminum to eliminate dead weight. Here's an inside view of this radical power plant.

PAGE 76

And another new engine. Studebaker gets rid of the old flathead, readies an OHV six for Lark.

PAGE 83

new ideas

Do you know which week to shop for the best deal on a new car? Which accessories *save* you money? It's all in "Six Ways to Save Money Buying a New Car."

PAGE 85

You can stay away from the lemons if you know how to be your own test driver.

PAGE 88

And safety. Have they cut corners in the rush to cut size and weight? Here are the facts from safety expert Paul Kearney.

PAGE 92

GM's New Entries: the "BOP" Cars



Buick, Olds, Pontiac Go Compact

**Here are the hottest little cars to come down the pike in years
—and there's an aluminum V-8 that cuts engine weight in half**

By Ken Fermoyale

YOU are now getting your first look at three brand-new automobiles. They wear nameplates that for a decade have signified bulk, frills, and power. The new ones are not big or gaudy. Powerful they are.

These are the Buick Special, Oldsmobile F-85, and Pontiac Tempest compacts.

All are much smaller, more economical, and lower in price than their big brothers.

The power comes with another innovation: a V-8 engine made of aluminum. It develops 155 or more horsepower from 215 cubic inches (3½-inch bore, 2 4/5-inch stroke). The big thing: It weighs just 350 pounds, half as much as a standard cast-iron engine like the Olds Rocket.

The BOP cars are a family, sharing

B

is for Buick, whose portholes are fabled.

So how can you miss it? The Special, it's labeled.





O is for Olds,
Tagged the F-85.
Though not supersonic,
It's lively to drive.

many parts and features (dimensions of all three are almost identical inside and out). But they differ in details. They share nothing with big Buicks, Pontiacs, and Oldsmobiles except names and dealers.

Here's what they're like:

- **Size.** They are right in the middle of the compact class: a bit bigger than Corvair and Rambler American, smaller than Comet and Rambler Six. Wheelbase is 112

inches, overall length about 189 inches. Inside, they are roomy. Leg room and head room almost match big-car dimensions, but hip room and shoulder room are about two inches less.

- **Power.** That half-weight hot engine zips the BOP cars away from any other compact (except the Lark V-8). They out-scoot many full-size makes.

- **Economy.** The BOP compacts run



P is for Pontiac,
With cat's-eye grille.
Tempest offers a
Four or a V-8 mill.

CONTINUED

73

No look-alikes, BOP cars differ inside and out



FAMILY RESEMBLANCE SHOWS, but sculptured lines in the body sides and fenders, plus individually styled dashes and interiors, help give

each BOP compact its own identity. Stylists used chrome trim less lavishly than on the bigger cars—they couldn't afford it.

25 percent farther on a gallon of gas than their big brothers, but not quite as far as less powerful compacts. Mileage should average 19 to 22 m.p.g.

● **Looks.** They are not stripped models, but handsome, well-appointed cars uncluttered by ostentatious gimmicks. (A lot of people will like that.)

● **Cost.** Base prices should start around \$2,200 to \$2,400 (the cheapest 1960 Buick was more than \$2,700). But by the time you get one delivered with automatic transmission and other oddments, you'll be lucky if the bill is less than \$3,000.

The differences. You won't have any trouble telling the BOP cars apart on the road. Grilles, hoods, rear decks, and side panels are all distinctively individual, as the photos show. Under the skin there are

significant variations among them, too:

● **Pontiac Tempest.** The basic car comes with the four-cylinder engine (split from the big Pontiac's standard V-8—as described last month in PS) and a floor-mounted stick shift. The bigger aluminum V-8 (identical with Buick's) is an extra-cost option. The Tempest has the unique transaxle we also described last month: Its transmission is located at the rear axle and connected to the engine by a slim, flexing shaft. This makes possible an almost flat floor—no transmission hump, a vestigial drive tunnel—and also independent springing for rear wheels.

● **Olds F-85.** The standard job is the aluminum V-8, rated at 155 hp. at 4,800 r.p.m., using a two-barrel carb, regular gas, and an 8.75:1 compression ratio. They'll

... And here are the BOP station wagons



FOUR-DOOR MODELS ALL, wagons have a fifth door at the rear. It is one piece, hinged at top to lift straight up. In the Olds F-85, the rear

window rolls down (there's a power option). The window is fixed in the other makes. Wagon fans may miss the length-adding tailgate.

also sell you a power pack (four-barrel carb and 10:1 compression-ratio head, giving approximately 175 hp.). The automatic transmission (optional) is a scaled-down Hydra-Matic with a new twist—a variable ratio in first gear.

● **Buick Special.** The aluminum V-8 is standard again, rated at 155 hp. but at 4,400 r.p.m. The optional transmission is a smaller, lighter—tricked up—Dynaflow. It gains efficiency at higher speeds by routing some torque around the converter through a direct mechanical linkage to the output shaft.

The engine. Aluminum power plants have a long and troubled history in Detroit. This one first came out of GM Research more than three years ago. It is a conventional design—90-degree V—that

combines familiar features from many cast-iron engines.

Revealed a Buick man: "One problem was caused by the different rates of expansion between aluminum in the block area surrounding the upper part of the crankshaft bearings and the cast-iron bearing caps. We got distortion and the bearings went out of round. You can figure what this did to crankshafts."

The solution: They beefed up the bearing caps, making them rigid enough to hold the aluminum sections in line.

Early aluminum castings were porous. They leaked. So special impregnating compounds had to be brewed. (Cast-iron engines require impregnators, too, but different kinds.)

The new engine is of course not all



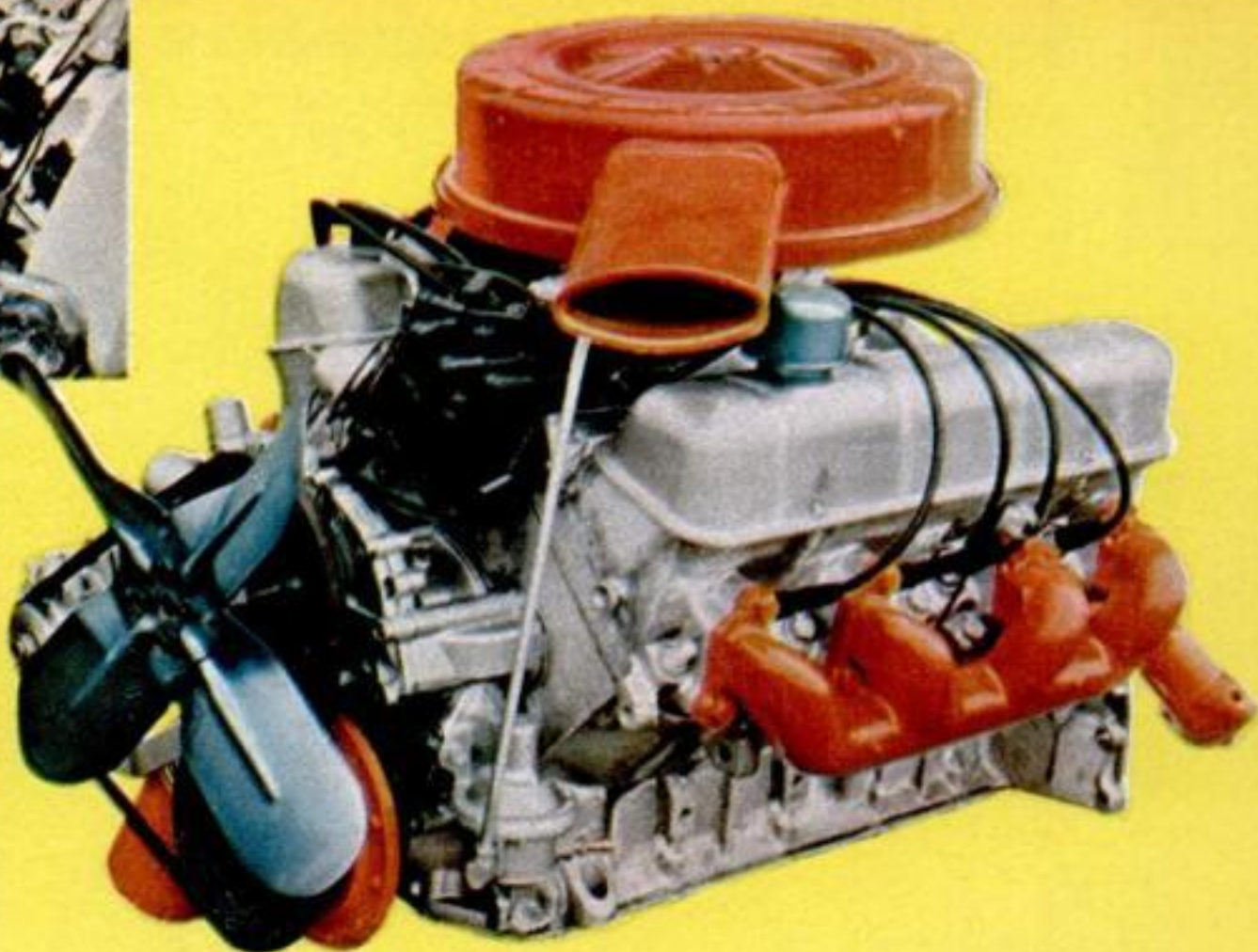
B



O



P



Three engine rooms reveal separate approaches

THERE'S LOTS OF SPACE around the four-cylinder mill in the Tempest at left. Olds and Buick V-8s come closer to filling their engine rooms, though the plugs, happily, can still be pulled without trouble. Note variation in battery placement. Cast-iron four outweighs the aluminum V-8s by about 120 pounds, has less horsepower but more torque in lower speed ranges. It should be cheaper to build. The aluminum V-8 above is Buick's version.

aluminum. Cast iron is used in areas of heavy wear and load—cylinder-bore liners, valve guides, exhaust manifolds, and main bearing caps, for example. The camshaft is cast of a special chrome-nickel-iron alloy. The crankshaft is Armasteel, a heat-treated cast iron.

The dry cylinder liners are 3/16-inch iron, with grooves around their outer surfaces. The aluminum block is cast around the liners, gripping them permanently by the grooves.

Both Buick and Olds accepted this basic block. Thereafter they went their own ways, capping the block with different cylinder heads and valve setups.

Olds engineers stuck with the same wedge-shaped combustion chamber that they have been using in their big Rocket V-8s. They knew it was dependable. It is also amenable to souping up (with the high-compression power pack that Olds offers).

The Buick men aimed for efficiency and economy. They shaped the combustion chamber to a pinched, flattened ball. The idea was to provide greater volume with less surface area. That reduces heat losses and converts more of the burning energy into usable power.

When you lift the hoods, the most noticeable difference between the Olds and Buick engines is their air cleaners. Buick is conservative, using the conventional upright type. Olds' air cleaner, however, clamps down on the intake manifold, completely covering and surrounding the carburetor. The advantages: protection for the carb, better silencing, and more uniform fuel temperature (faster warm-up, cooler cruising).

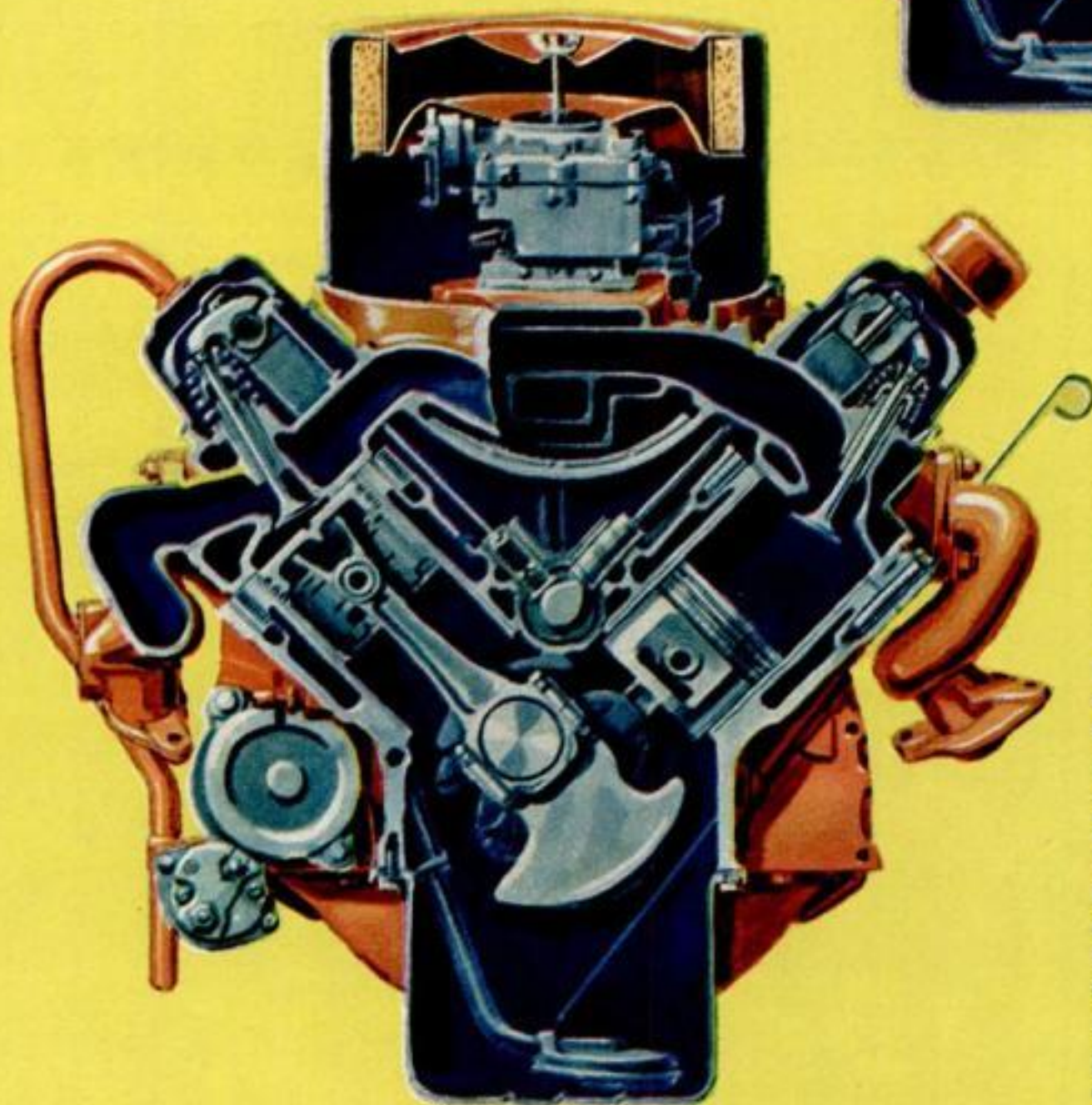
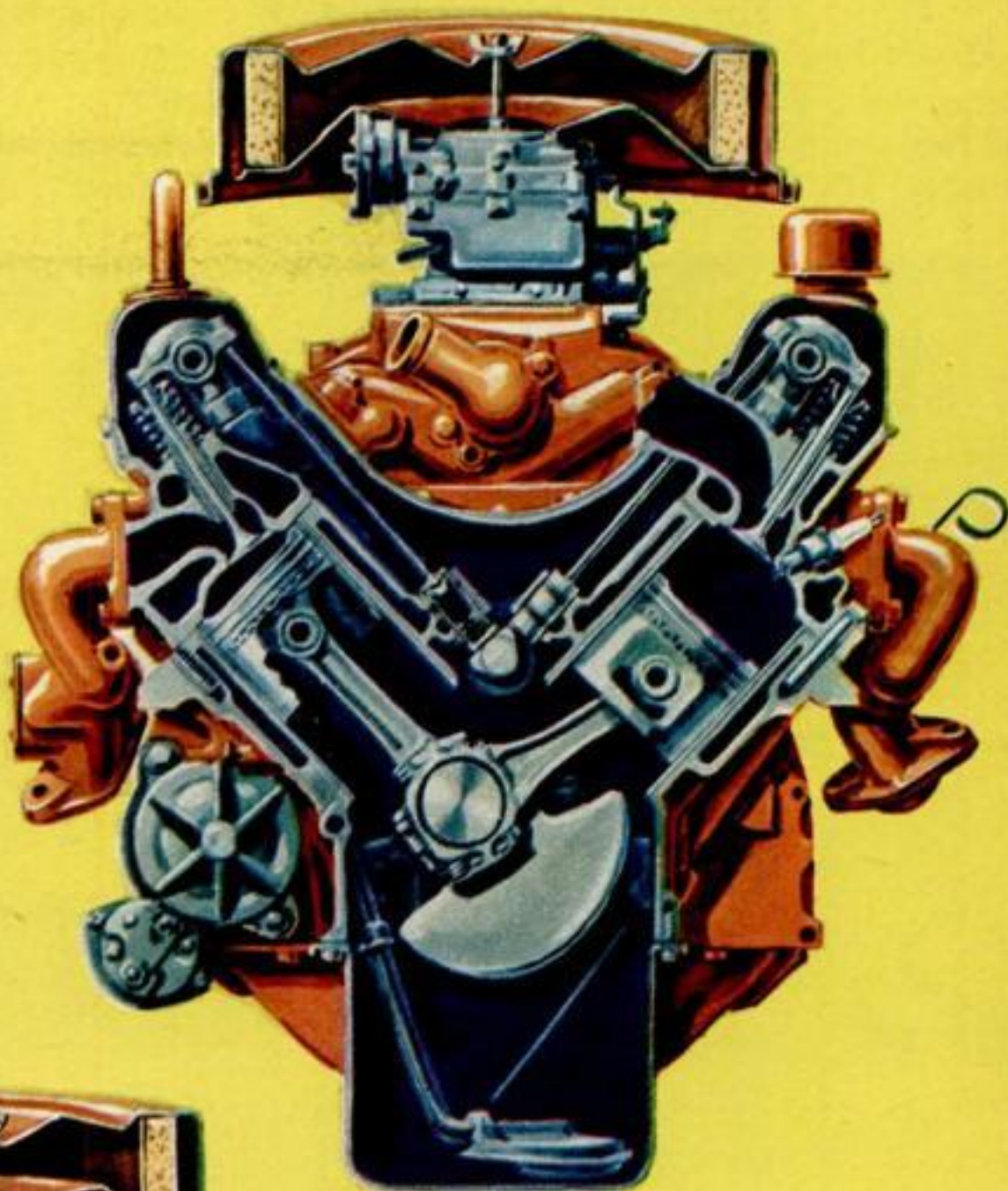
The water-jacketed intake manifolds also look different, but that's to accommodate the air cleaners. Inside, they're the same "split-level" design.

[Continued on page 244]

Here's how the two V-8s differ

B

ATOP BUICK SPECIAL is a conventional air cleaner. Another distinguishing mark: vertical rocker-arm covers. Inside, the combustion chamber is roofed in the shape of a slightly flattened ball. Note that the tops of the pistons are dished to match. Valve springs and rocker assemblies also differ, following big Buick rather than big Olds designs. Compared to its non-identical twin, Special's engine has slightly smaller valves. Buick will also build the V-8s that are optional for Tempests.



O

OLDS F-85 ENGINE is identifiable by top-hat air cleaner that drops down around its carburetor, and by rocker-arm covers that follow the lines of the 90-degree vee. Most important internal difference: a wedge-shaped combustion chamber with a "squish" area, as in the big Olds. Both engines drink standard gasoline, though a power-pack version of this one will need premium.

Restyled Ford needs fewer grease

THE new Ford is new on the surface and beneath. It looks different: more conservative and smaller. Length has shrunk four inches (to 210), width 1.6 inches (to 79.9). But inside, space for

passengers and their luggage is the same.

Significant mechanical changes show up, too.

There are no grease fittings. Factory-applied molybdenum disulfide grease



De-finned Plymouth starts, steers,

DRASTIC sheet-metal surgery gives Plymouth an entirely different look for 1961. Stylists chopped off the flamboyant fins and created a broad, flat rear deck. The full-width grille is gone.

Engineers concentrated on the electrical system, steering, and gearboxes.

A new starter works more quietly. It also has an over-running clutch to protect the starter armature against overspeeding



jobs, oil changes

keeps the chassis lubricated for about two years. Then you'll have to unscrew plugs, install fittings, and grease it.

Oil changes are set at 6,000 miles. For most people, that will mean no change until the weather requires it.

Side windows no longer have laminated safety glass, but tempered sheet, which is stronger. When it does go, it breaks in a checkered pattern without splinters.

Besides the familiar 292- and 352-cu.-in. V-8s, there are two substantially reworked power plants.

- A husky 390-cu.-in. V-8 becomes the biggest, most powerful engine Ford has ever built for standard passenger cars. Basically it's the 352-inch V-8, bored to 4.05 and stroked to 3.78 inches.

- The 223-cu.-in. six comes with new rocker arms designed to keep valves quiet. The trick is a spring-loaded cam that compensates for wear and heat expansion. You may see this system on more Ford engines later (it's cheaper than hydraulic valve lifters).



FORD TRADEMARK—big round tail lights—makes the '61 easy to spot from rear. Front view is distinctive, too: higher, narrower hood, concave grille, wide-spaced lamps, flat roof.

shifts easier

if you hold the ignition key in "start" position after the engine fires.

A new lightweight distributor has an aluminum housing. Nylon in the breaker points reduces friction; they are lighter, too, and have less tendency to "bounce" at high speed.

Plymouth also has the new generator that makes alternating instead of direct current. It saves weight, produces more juice for stop-and-go driving.

A heavy-duty three-speed manual transmission is now standard equipment for all 361- and 383-cu.-in. V-8s, and also for the 318-cu.-in. job when equipped with power pack. It is synchronized in second and high gears only.

A fabric-reinforced rubber coupling between the steering gear and shaft on manual-steering cars acts as a universal joint to accommodate variations in alignment. Result: smoother steering. Power-steering cars have a self-tightening belt device that is supposed to reduce belt slippage, improve steering feel, and prolong belt life.



SWEEPING CURVES accent the '61 Plymouth's narrower, higher grille and form eyebrows over the dual headlamps. Small center ridge in rear deck replaces the high tail fins of past years.

Dodge



THE fins remain, but just barely. Instead of flaring skyward, they slope off at the rear to outline the side-curving tail lights. The front is simpler, with a con-

cave, slotted grille. Mechanical innards and dimensions vary only slightly from 1960. This year there's only one Dodge: the Polara.

.....

Buick



SLIGHTLY higher rooflines and elimination of the dogleg in the front-door opening let you climb in and out more easily. Styling emphasizes the massive look that

was a Buick trademark during the make's most successful years. The portholes are back and fancier than ever. Engineering is little changed.

.....

Dart



THE hot-selling Dart is one of the few '61 cars to grow in size. It's longer and wider—but by less than an inch. It shares with big-brother Dodge a neat, concave

grille and low-flying fins. Like the rest of the Chrysler line, it uses the lightweight AC generator that first showed up last year on Valiant.

DeSoto

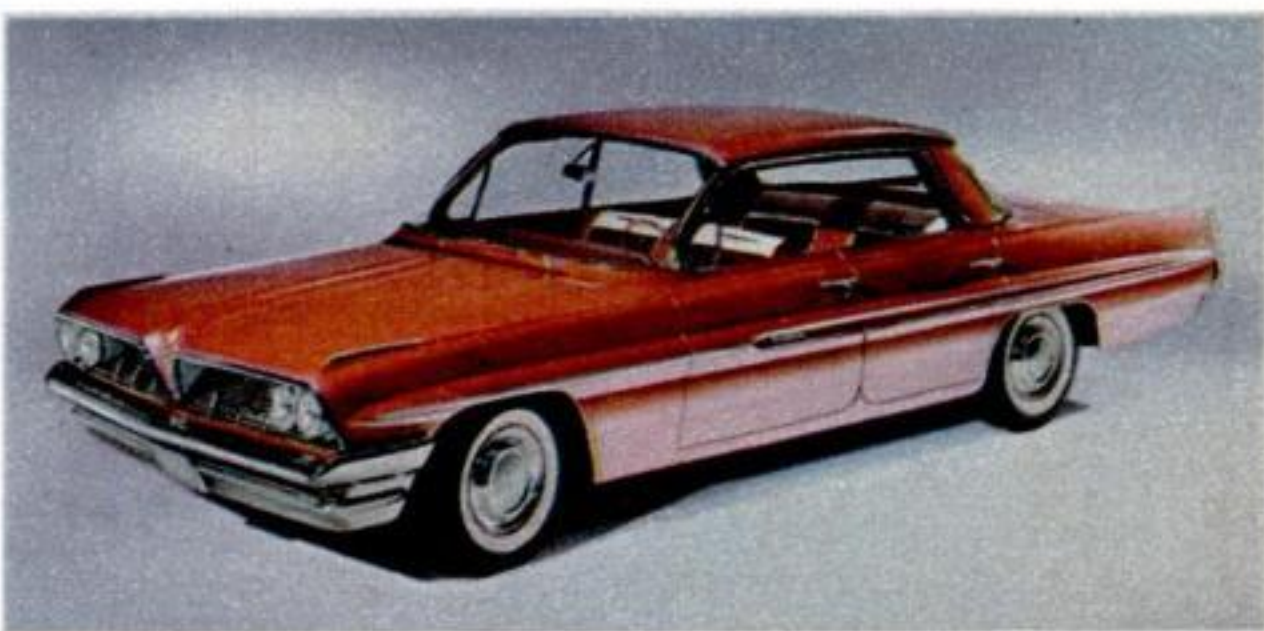


DESPITE all rumors, the DeSoto refuses to die—although only the Adventurer series survives, little changed, for 1961. Identify it by an unusual split-level grille, with

a protruding fine-mesh top and an eggcrate rectangle below. Canted dual headlamps flank the grille. The fins soar high as ever.

.....

Pontiac



A NEW, more rigid "perimeter" frame hugs the outline of the '61 Pontiac's narrower, shorter body. The side rails extend out under the rocker panels—to act as

buffers in case the car is hit from the side. Stylists straightened the front pillars (no dogleg), then topped the pillars with a new roof.

.....

Imperial



IMPERIAL brings back the past with free-standing, cast-aluminum headlamps, "suggestive of the road lamps of classic automobiles," according to the blurbs. The

fancier-than-ever tail fins bring you right back to the present. Among the nuts-and-bolts changes: a gearless, magnetic-drive speedometer.

Lancer: New Compact from Chrysler



DODGE's new compact wears a different face and bustle, but its body is the same as the Plymouth Valiant's. You can tell the near-twins apart by the Lancer's full-width grille, ridged rear deck lid, modest round tail lights, and reverse-curved side trim.

Mechanically, the two compacts are nearly identical. Both use the same 170-cu.-in. slant six. But the Lancer has a power option for drivers who like their engines hot: the peppy 225-cu.-in. six that ordinarily comes in Plymouths and Darts.

.....

Falcon



You get your choice of engines with Falcon now. The 144-cu.-in. six is still standard, but a more powerful 170-cu.-in. job, developed originally for Comet, is also

available. Other changes are slight: a one-piece aluminum grille, heavier steel in the upper door frames (for rigidity), softer rear springs.

.....

Valiant



A FEW chrome bars on the rear fenders and bigger squares in the Chrysler 300-style grille are the only exterior changes in the 1961 Valiant. The 170-cu.-in. engine

has a slightly lower compression ratio (8.2:1 vs. 8.5:1 in '60) so it won't gag at the low-octane regular gas sold in some parts of the country.

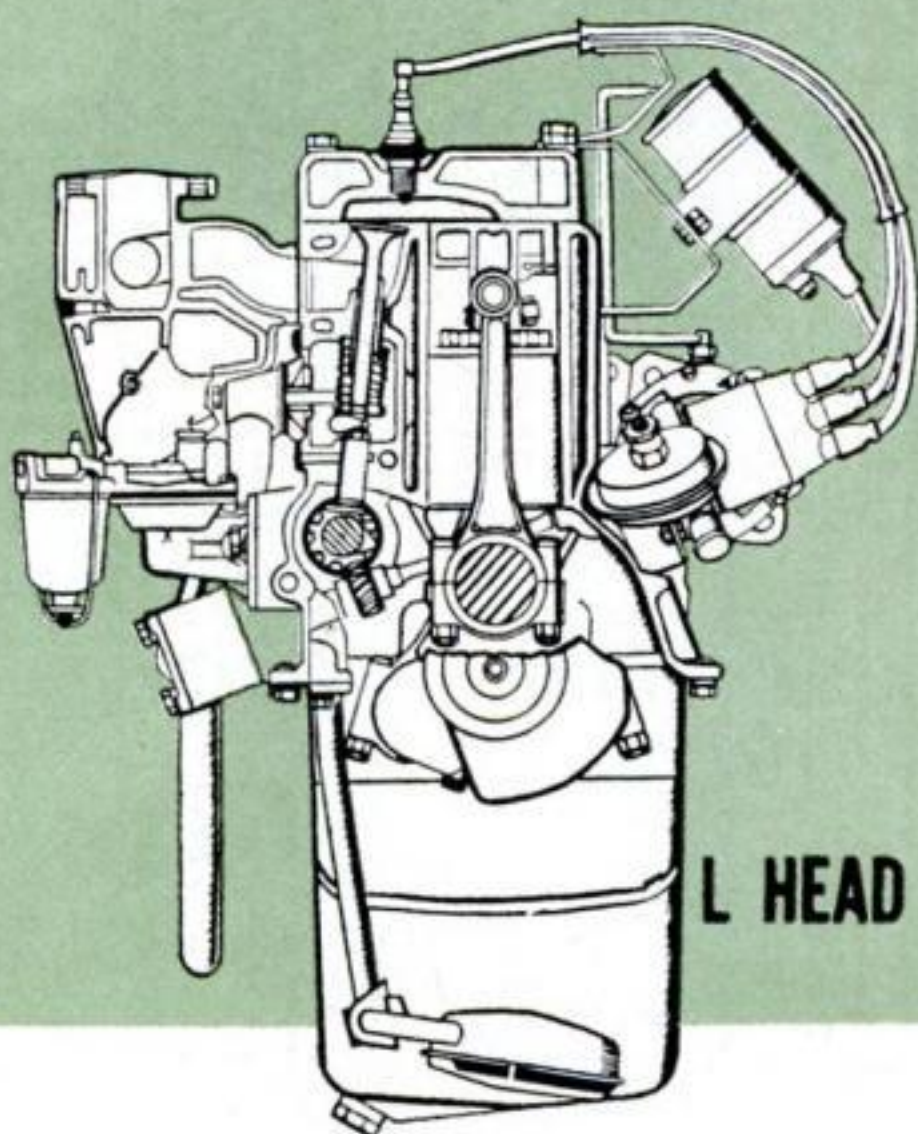


Lark Gets 112-Hp. OHV Engine

FLATHEAD engines go one step further toward history this year. Studebaker has remodeled its faithful old six-cylinder power plant, around for decades, with fancy new overhead valves.

The new Lark engine produces 112 hp.

at 4,500 r.p.m. from 170-cu.-in. displacement. Torque is 154 lb.-ft. at 2,000 r.p.m. That's a jump over the old mill, which got 90 hp. and 145 lb.-ft. from essentially the same block. Compression ratio is 8.5:1. Styling is little changed.



Optional Engine Adds Zoom to Comet

PERFORMANCE is the 1961 bonus for Comet. It can be had with an optional engine (the standard one, stroked .44 inch to 170-cu.-in. displacement). The longer stroke gives some extra horsepower, but mainly boosts torque to improve hill climbing. The ratings are 101 hp. and 156 lb.-ft., compared with 85 hp. and 134 lb.-ft. for the standard job.



COMPARING THE COMPACTS FOR 1961

	BUICK SPECIAL	COMET	CORVAIR ^a	FALCON	LANCER	LARK	OLDSMOBILE F-85	PONTIAC TEMPEST	RAMBLER AMERICAN	RAMBLER 6	VALIANT
WHEELBASE (in.)	112.0	114.0	108.0	109.5	106.5	108.5	112.0	112.0	100.0	108.0	106.5
OVERALL LENGTH (in.)	188.4	194.8	180.0	181.2	188.8	175.0	188.2	189.3	173.1	189.8	184.0
WIDTH (in.)	71.3	70.4	66.9	70.6	72.4	71.4	71.6	72.2	70.0	72.4	70.4
CURB WEIGHT (lb.)	2,732	2,515	2,415	2,395	2,750	2,750	2,695	2,900	n.a.	n.a.	2,748
TIRE SIZE	6.50x13	6.00x13	6.50x13	6.00x13	6.50x13	6.00x15	6.50x13	6.00x15	6.00x15	6.50x15	6.50x13
TURNING-CIRCLE DIAMETER (ft.)	38.1	39.9	39.0	38.8	37.1	37.5	37.0	41.0	36.0	37.3	37.1
WT. PER SQ. IN. OF BRAKE AREA (lb.)	22.0	22.0	20.0	21.0	21.3	23.0	20.7	26.5	n.a.	n.a.	21.3
				ENGINE							
TYPE				OHV 6	30°-inclined OHV 6	OHV 6	aluminum OHV V-8	45°-inclined OHV 4	L head 6	OHV 6	30°-inclined OHV 6
DISPLACEMENT (cu. in.)	215.0	144.3	140.0	144.3	170.0	170.0	215.0	194.5	195.6	195.6	170.0
HORSEPOWER @ R.P.M.	155@4,400	85@4,200	80@4,400	85@4,200	101@4,400	112@4,500	155@4,800	110@3,800	90@3,800	127@4,200	101@4,400
OPTIONAL EXTRA HORSEPOWER	none	101@4,400	98@4,600	101@4,400	145@4,000	195@4,500 ^b	n.a.	155@4,400 ^b	125@4,200	215@4,900 ^b	148@5,200
WEIGHT PER HP. (lb.)	17.6	29.6	30.2	28.2	27.2	24.6	17.4	26.4	n.a.	n.a.	27.2
TORQUE (lb.-ft. @ r.p.m.)	220@2,400	134@2,000	128@2,300	134@2,000	155@2,400	154@2,000	210@2,800	180@2,000	160@1,600	180@1,600	155@2,400
COMPRESSION RATIO (to 1)	8.8	8.7	8.0	8.7	8.2	8.5	8.75	8.6	8.0	8.7	8.2
				DIMENSIONS							
SHOULDER ROOM (in.)	Front	55.2	54.0	55.3	54.0	55.5	55.2	55.2	51.5	57.7	54.6
	Rear	54.6	53.6	55.2	54.1	54.5	54.6	54.6	49.8	57.6	54.1
HEAD ROOM (in.)	Front	34.0	33.9	34.0	33.9	35.3	38.2	34.0	35.0	35.0	33.6
	Rear	33.9	32.8	33.4	32.8	34.8	37.1	33.9	33.0	34.0	33.4
HIP ROOM (in.)	Front	58.6	57.0	57.8	57.1	59.5	58.6	58.6	58.0	59.8	57.0
	Rear	58.2	56.7	57.6	56.7	59.0	58.2	58.2	45.3	60.1	56.9
				ESTIMATED PERFORMANCES							
ACCELERATION (sec.) 0-60 m.p.h.	13	23	20	21	15	18	13	12	18	18	15
TOP SPEED (m.p.h.)	100	85	85	85	95	85	100	100	85	90	95
GAS MILEAGE (m.p.g.)	20	22.5	24	25	20	22	24	21	25	24	20

n.a. Information not available ^a 1960 data listed applies to 1961 model with minor exceptions ^b V-8 engine

6 Ways to Save Money Buying a New Car



By Watson Fënimore

YOU can save money on the price of your 1961 car with a little know-how on buying. Here is what you should know before you step into the salesroom:

- When to buy.
- How to deal with dealers.
- What not to believe in the advertising.
- What models and brands are the best value.
- What accessories are good investments.
- The ins and outs of financing.

1. Choosing the right time to buy. Depending on your car-buying habits, you may get your best dollar deal in late sum-

mer or early fall, before the next year's models come out. That's when factories are offering incentives to dealers to move cars. Salesmen can give you an extra \$50 to \$100 over the customary discount. This does have its disadvantage—when the new models arrive, you're driving a last-year's car.

The prime consideration here is how long you plan to drive it. If you're an every-year or every-other-year trader, you're not getting much of a bargain—you take a whole year's depreciation within a few weeks. But if you tend to keep a car for several years, depreciation—spread out over a longer period—is a smaller factor.

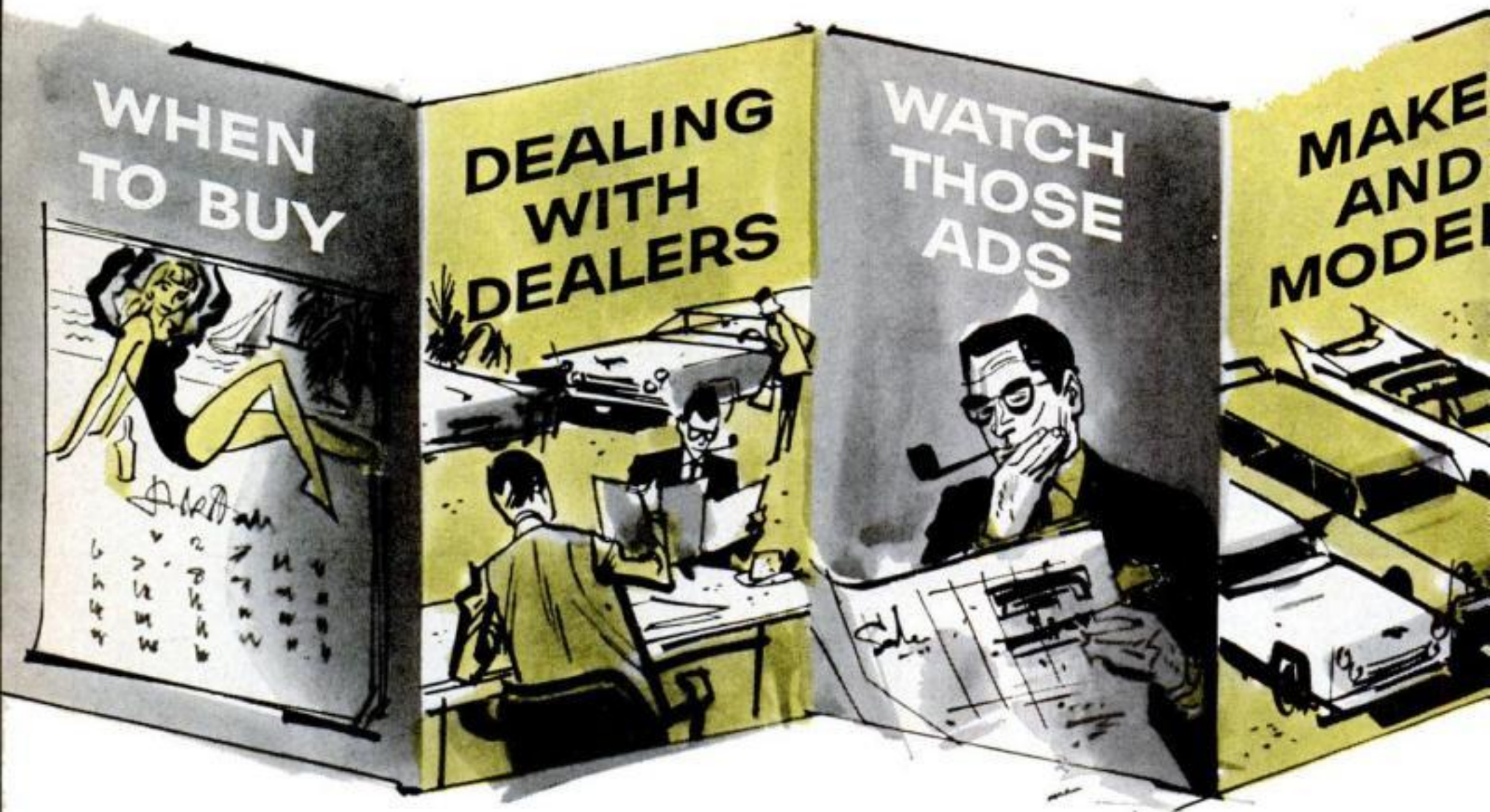
Buying right after the new models appear, later in the fall, is not your best bet on a strictly dollar basis. Dealers are not in a mood to talk discounts. Cars may be loaded with extra-cost gadgetry. And, with winter coming on, trade-in value is low. But—the thrill of a new car when the model is fresh as your breakfast egg may outweigh more practical factors. And you do get a full year's driving before the *next* new model outdates yours.

Midwinter buying is an alternative. Car sales are slow in December, January, and February. Discounts have started.

As for spring and early summer, remember that these are periods of high-

CONTINUED

85



volume sales—especially for convertibles and hardtops—and low discounts.

Buying a new 1960 model after the 1961s have arrived is rarely a bargain. A smart dealer rarely is stuck with expiring models he can't sell; however, he may keep a few in stock for customers who hope to get a sizable discount. The only worthwhile deal on a car such as this is about 30 percent off the list price on the sticker.

Whatever season you choose, buy toward the end of the month. Salesmen are anxious to meet their monthly quotas. Dealers are liberal—they want to wind up the month well on factory sales charts.

2. Dealing with dealers. The day of the "price pack"—when dealers arbitrarily added hundreds of dollars to the list price of a new car so they could offer a fat overallowance on your trade-in—is gone. But the price sticker that legally must be posted on new cars is not a firm figure. It is subject to discount. The dealer expects you to haggle. Remember that the cash difference between the new-car price quoted you and the allowance on your trade-in is all that counts.

How good a bargain can you get? That will depend on your ability as an old-fashioned horse trader.

The salesman's perfectly legitimate aim is to extract the maximum profit from you. Don't let him upgrade you past

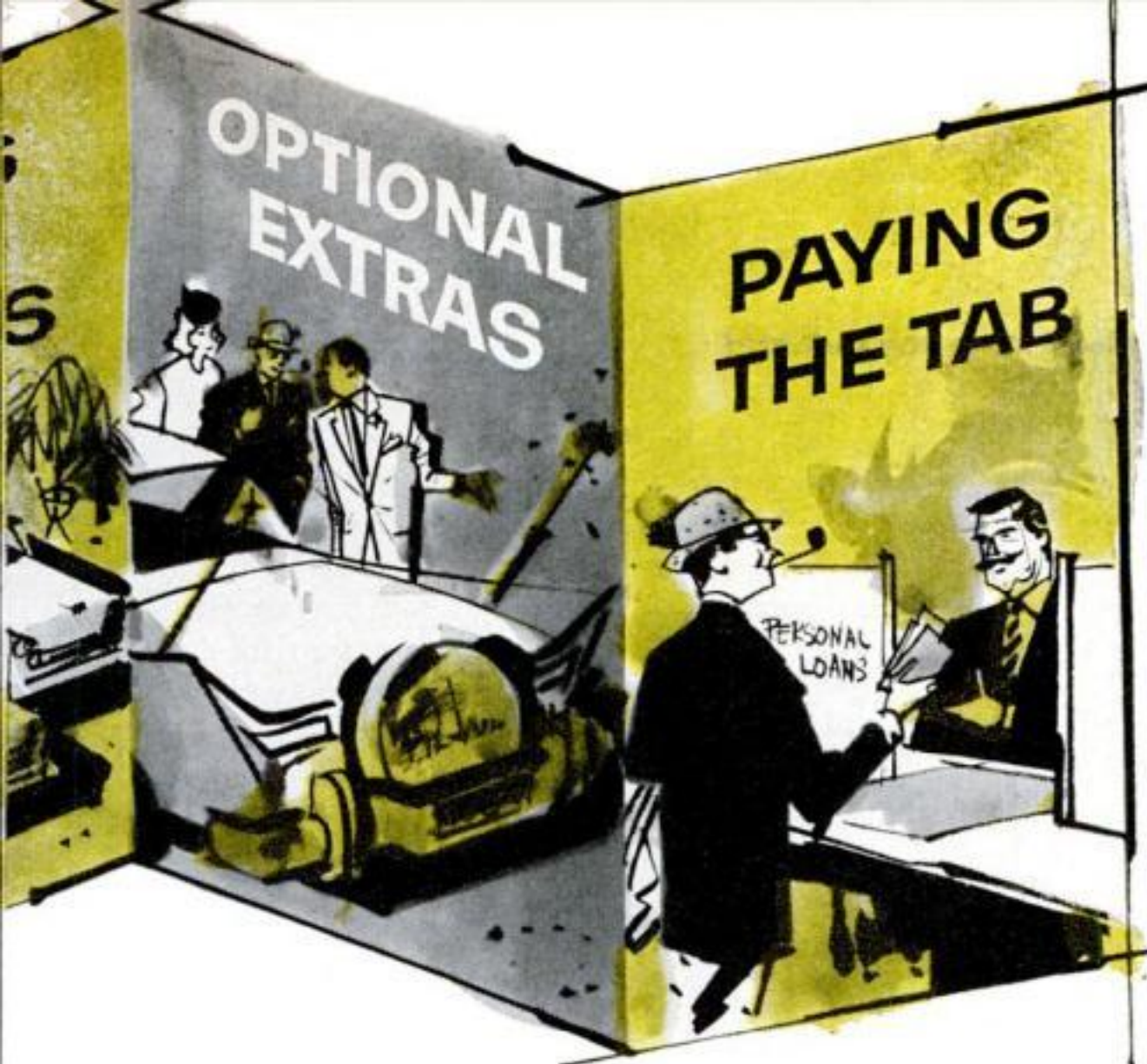
your pocketbook. Don't take terms you don't want. Don't be rushed into a sale. If the agency doesn't have the car and equipment you want, wait. It can get them from another dealer or the factory. Remember, you have the last word: NO. The salesman will go to any reasonable lengths to avoid losing a sale.

3. Can you believe the ads? Mistrust offers to sell for "No Money Down" or for an exceptionally low down payment. High carrying charges on long monthly payments, typical of such deals, can cost you several hundred extra dollars.

Mistrust offers of fantastically high allowances for your trade-in. This device frequently is used as a come-on. A salesman offers you the high price on the trade-in. You close the sale. The salesman's boss balks. You are whipsawed back and forth between the two men until you agree to a lower figure.

Mistrust claims that the dealer is selling below cost. This never happens. The unscrupulous dealer will make his money on some kind of finagling, perhaps a fast shuffle on your monthly payments. If you agree to a \$5 increase on your payments, you are out \$180 on a 36-month contract. Many a car has been sold for less profit.

Mistrust offers of new cars for eye-popping low sums. The price may not include the freight charge. The car will be the lowest-priced two-door sedan in



the line. It may have accessories and special trim at added cost. You probably will be pressured into upgrading your purchase or buying optional equipment.

4. Makes and models. The compacts introduced a year ago have added a new factor to the U.S. price structure. So have the small imports. The smaller cars cost less and are cheaper to operate. The question for you is whether these cars have the space, performance, and riding characteristics you want. If they do, you save money.

In standard-size U.S. cars, a good rule of thumb is that resale value will be proportional to the car's popularity when new. Ford, Chevrolet, and Plymouth have long been resale leaders; Rambler and several of the compacts are now on the list. Plain-Jane cars depreciate faster than the classier models of the same make.

U.S. six-cylinder cars average about \$120 cheaper than eights of the same model. Furthermore, the sixes cost less to run and repair. Except for a few luxury models, sixes have a higher resale value in proportion to cost.

5. What accessories should you buy? Some accessories and pieces of optional equipment, besides being useful in themselves, are worth extra money at trade-in time.

Automatic transmission and power

steering are at the top of this list. Behind them come power brakes, air conditioning, radio, and heater. Money spent on most other extras is gone; you probably will get nothing back for power seats and windows, fancy upholstery, wheel covers, whitewall tires, extra lights, mirrors, and tinted glass. If a car is loaded with these options, ask for another model.

6. The ins and outs of financing. Financing a car costs you extra money. On a \$2,400 deal, if you put down only \$400 and stretch out payments to 36 months at \$66 a month, the interest adds up to \$376. Putting down \$1,000 and paying off in 18 months at \$85 a month costs you only \$130—a saving of \$246. Obviously it's wise to make as large a down-payment as you can and pay up quickly.

Be sure to read the financial terms before you sign the contract. A few unscrupulous dealers sometimes raise the price of the car on the contract; if you sign, you're stuck for the extra money.

Watch out for suspiciously low monthly payments; the last payment may be a several-hundred-dollar whopper.

To sum up, know what you want and stick to it when you approach a dealer. Don't expect miracles. Offers that sound too good to be true usually are.

Most important of all, shop around to find the best deal.

How to Test-Drive

THE man who wouldn't think of buying a \$60 suit without trying it on often shells out 50 times as much for a car he's never driven. According to experienced car salesmen, only one customer in five takes a demonstration drive before he closes the deal.

Chances are your new car will be your daily companion for at least two or three years. What, most of all, are you looking for? Do you insist on scalded-cat acceleration? Or a smooth ride that would put a magic carpet to shame? Only a demonstration can tell you whether a car is right for you.

In today's competitive market, most salesmen are willing, and even anxious, to give prospects a test drive. A dealer

Test-Driving Check List

KEEPING SCORE as you test-drive makes detailed comparison easy. Just mark each item yes or no.

	CAR A	CAR B	CAR C
BODY			
Easy to enter and leave?			
Seat height right?			
Pedals convenient?			
Steering wheel properly located?			
Instruments easily read?			
Windshield distortion?			
Front or rear blind spots?			
Wiper coverage good?			
Controls easy to reach?			
Excessive wind noise?			
Trunk easy to load?			
ENGINE			
Start easily when cold?			
Start easily when hot?			

	CAR A	CAR B	CAR C
Cold-engine buck?			
Engine stall?			
Idle smooth?			
Engine noisy?			
Vibration at any speed?			
Acceleration satisfactory at all speeds?			
Engine knock under load?			
Quick warm-up?			
Overheating in traffic?			
MANUAL TRANSMISSION			
Lever easy to reach?			
Shift smooth and positive?			
Gear ratios well spaced?			
Clutch chatter in first or reverse?			

a New Car

By Bill Taylor

may even lend you a car overnight or for a weekend.

To get the most out of your demonstration, drive the car on a road that you frequently travel. Compare its ride, handling, and performance with your own car's. An unfamiliar road gives no standard of comparison. Besides—if you have to devote your attention to “reading” the road, you can't concentrate on putting the car through its paces.

Whenever possible, take your demonstration in the same model that you plan to buy. Station wagons often are noisier and harder-riding than sedans of the same make. Convertibles don't have the visibility of hardtops. Windows are more likely to bind on hardtops than on

sedans. (Roll them up and down, to see.)

A test ride also is helpful in deciding between two options. If you're uncertain whether you want the economy engine or the power-pack, try both over the same route.

Try to differentiate between inherent design weaknesses and a car's individual defects of assembly. If the transmission doesn't shift smoothly, try another car with the same transmission before condemning the make. If the car rolls on turns or steers sluggishly, check tire pressure and try it again.

The accompanying road-test questionnaire can help you evaluate the new cars as you drive them. Snip it out and take it with you on your next demonstration.



AUTOMATIC TRANSMISSION

CAR A CAR B CAR C

Smooth initial engagement?
Smooth automatic shifts?
Unexpected down-shifts?
Kickdown available when needed?
Ratios well spaced?
Engine braking effective?

	CAR A	CAR B	CAR C
Smooth initial engagement?			
Smooth automatic shifts?			
Unexpected down-shifts?			
Kickdown available when needed?			
Ratios well spaced?			
Engine braking effective?			

STEERING

Steering hard?
Too much wheel winding?
Good wheel-return after turns?
Car maintains course without frequent correction?
Road shock transmitted through steering wheel?
Power assist cuts in and out noticeably?
Power-steering squeal or chatter on sharp turns?

	CAR A	CAR B	CAR C
Steering hard?			
Too much wheel winding?			
Good wheel-return after turns?			
Car maintains course without frequent correction?			
Road shock transmitted through steering wheel?			
Power assist cuts in and out noticeably?			
Power-steering squeal or chatter on sharp turns?			

RIDE AND HANDLING

CAR A CAR B CAR C

Pitch or wallow on uneven road surface?
Quick recovery after series of bumps?
Bottom on rough roads?
Excessive roll on turns?
Rear-axle hop on washboard pavement?
Creaking or body rattles on rough or uneven road?

	CAR A	CAR B	CAR C
Pitch or wallow on uneven road surface?			
Quick recovery after series of bumps?			
Bottom on rough roads?			
Excessive roll on turns?			
Rear-axle hop on washboard pavement?			
Creaking or body rattles on rough or uneven road?			

BRAKES

Brakes grab or pull?
Pedal effort high?
Brakes squeal or chatter?
Brakes grab when damp?
Brakes overheat or fade after frequent use?
Parking brake easy to apply and release?
Parking brake hold on hills?

	CAR A	CAR B	CAR C
Brakes grab or pull?			
Pedal effort high?			
Brakes squeal or chatter?			
Brakes grab when damp?			
Brakes overheat or fade after frequent use?			
Parking brake easy to apply and release?			
Parking brake hold on hills?			

850 Miles in Buick's New Compact

By Devon Francis

ONE morning early last July I slipped behind the wheel of a 1961 Buick Special in Buick's home town of Flint, and headed for the wilds of Michigan.

This was a new little Buick, and quite literally "little." It was a couple of feet shorter than a standard Ford, Chevrolet, or Plymouth, and only eight inches longer than a Corvair. It was, in fact the littlest Buick in 30 years.

I was in for some surprises.

The car was still a secret, not to be unveiled to the public until October. Yet it was not camouflaged. It was a regular production car, Number 7 off the pilot line. Chrome lettering advertised Buick and Special saucily at the front and at the back.

The Buick tycoons were depending on confusion over a flood of new "compacts" to thwart premature publicity. Their only fear was that someone might photograph the car for the newspapers three months early.

In the next 2½ days I would drive the new Buick Special 850 miles. I would find out what its tidy, new, aluminum V-8 engine would deliver on a gallon of gas. Frankly, I had tongue in cheek. This was no engine in miniature. It measured out at 215 cubic inches and packed 150 horsepower.

Beside me as a traveling companion was a man-mountain named Charlie Wurtz, one of Buick's quality-control experts. He stood six-feet-three in his socks, weighed 250 pounds, could pack away enough food to feed a combat platoon, and proved to be one of the smartest guys about cars that I've ever known—a

sort of Gus Wilson in a business suit.

Wurtz was along for a reason: If anything went wrong with this vehicle, he would have to fix it. We couldn't take it to the nearest Buick garage. The new Buicks were as much a secret from Buick dealers as from the public.

The car already had 590.4 miles on it. It had Buick's new, simplified Dyna-flow transmission and—this annoyed me, to see a neat little car gadgeted up so soon—power steering.

The start. We topped off the fuel tank with regular gas, as the manual advised.

"It's all yours," announced the amiable Mr. Wurtz.

I pulled the selector lever into Drive and stepped on the accelerator. That was my first surprise. For a compact, here was something fresh. We shot forward. I would have to learn to ease the pressure from my right toe. The transmission slipped quietly into high.

Leaving Flint, we encountered bumpy railroad crossings.

"Hit 'em hard," said Wurtz.

I did. The suspension planed down the bumps. The ride was superb.

On the open road I jockeyed back and forth between 45 and 55 miles an hour for a good break-in. We were headed southwest so we would encounter stop-and-go driving through the interminable small towns between Flint and Benton Harbor, over on Lake Michigan.

The car was built low. Yet Buick had managed an astonishing amount of room inside. Once I glanced at Wurtz' head, calculating his clearance under the roof. It was a good 2½ inches. With my five-feet-seven, I could have worn a silk topper.

Wurtz' long legs had abundant room



Smallest Buick in 30 years. It drew curious stares from other cars.

Charlie Wurtz' six-feet-three looms over Special on the far side. But folding himself in was easy.



behind the firewall. And that tar-and-tarnation dogleg windshield post finally, finally was gone. I could even forgive Buick for resurrecting its portholes.

"She hiccups a little at light throttle between 40 and 50," I remarked at dinner that night.

The second of the pot's two jets was cutting in somewhere in that range.

"I know it," said Wurtz. He rubbed a forefinger down each side of his mouth. "It's one of two things. It's the float level—that's an easy production fix—or, with the jets leaned-out for economy, we're getting backtalk from the tightness of the engine and transmission."

He frowned. "We probably could mend it with a richer mixture during break-in. Want to wait and see?"

We learned quickly that the power surging didn't occur at brisk throttle.

Trying the curves. The next day we cruised north, stepping up our road speeds. The needle hovered between 55 and 60. The Special rode like a dream. I tried curves at 60 that were posted for 40. The rear end clung to the pavement.

On our first refill, at Holland, we topped off at 11.5 gallons. Wandering around a bit, sightseeing, we had come 215 miles, averaging 18.7 m.p.g.

"We'll do better," predicted Charlie Wurtz. "She's still tight."

The pump jockey at the station eyed the car curiously.

"Check your oil?" he asked with feigned innocence.

"Oil's okay," replied Wurtz, pokerfaced. He had anticipated efforts to get a look under the hood by examining the dip stick in private a few miles back.

Returning from lunch in

Ludington, we found three men around the car.

"Hi," said Wurtz, the soul of geniality.

"This a new Buick?" asked one man.

"It's sort of a special job," said Wurtz, adhering strictly to the truth. "We're testing it." Our three visitors started to move off. "What's your rush?" asked Wurtz.

I was dumfounded when he raised the hood and began describing the engine in double-talk. Four or five minutes went by.

"Well," said Wurtz finally, "nice to see you."

He latched the hood. We climbed aboard.

"That ought to overdevelop his Polaroid picture sufficiently," commented Wurtz blandly as we moved off. His eye had caught what mine hadn't—as we approached the car, one of the three men had torn the paper tab off a freshly exposed Polaroid shot. Throughout the conversation he had hidden the camera behind his back.

Special secret. A man and his teen-age son halted beside the car while we parked for a coke in Manistee. The man shook his head and glanced questioningly at the youngster.

"It's a 1961 Buick Special, Pop," said the boy, adding with a malevolent grin at us, "It's secret."

Twice we drew good-sized crowds, but we spotted nary a camera.

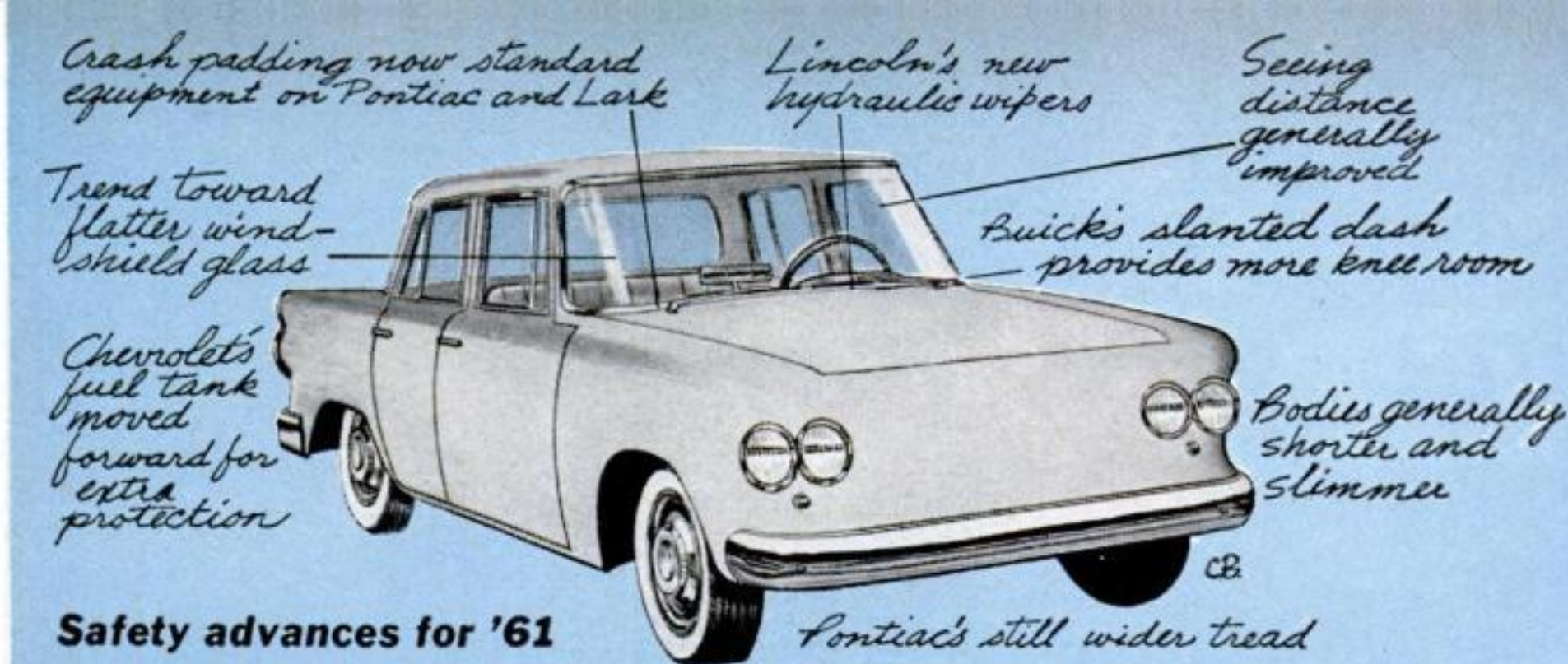
Near Traverse City, in Michigan's famous cherry country, we took 10 gallons of gas aboard. Our m.p.g. had been 21.7.

On our second night out, at the Straits of Mackinac sepa-

[Continued on page 235]

A Buick? Yep.





Safety advances for '61

A Safety Expert

By Paul W. Kearney

Noted authority on highway safety

IN THIS year of bigger small cars and smaller big cars, Detroit has moved a little—just a little—toward greater safety. There are gains, even though one momentous advance is in litter disposal rather than safety. Windshields are coming back closer to the right front passenger—which is bad news for the wives and girl friends who so often fill that role.

Virtually no change has been made in the widespread but stupid arrangement of window cranks and door levers that can fracture a kneecap in just a hard stop. Not content with this, several lines have added tissue dispensers, record players, and air-conditioning gadgetry in places around the front cockpit where they can bring painful injury.

That notorious fox trap, the one that pins rear passengers' feet securely under the front seat, is still with us. In this detail Chrysler Corp. products have improved over last year; Ford offerings are generally worse; GM's fair to very good. (Indeed, the Olds F-85 is better in this respect than some of its big brothers.) Universally lacking is any trace of crash padding along the upper edge of the front-seat back. Evidently not many engineers ride in back.

The credit side. Probably the most obvious improvement for 1961 is a general taming-down of the juke-box influence on instrument panels. There is less

needless brightwork—and an attendant reduction in eye strain.

Another welcome advance is a sobering of windshield design. Excessive bulge and wraparound seem to be giving way to flatter glass. This should improve visibility in driving snow or rain, even though most windshields are still much too big for their wipers.

The industry as a whole is entitled to recognition for its belated reversal of the mania for longer and wider cars. This year most standard models are 6 to 16 inches shorter overall. Even more important, most models are also narrower in outside dimensions without sacrifice of interior room. Last year no less than nine cars arrogantly exceeded 80 inches in width. Traffic engineers have been seriously concerned because cars need more elbow room as speeds increase.

Still with us, however, is the low silhouette. Highway engineers say that grades, guard rails, and other road-design features are based on the assumption that the driver's eye level will be 54 inches from the ground. Today the average is 48 inches, with many cars fixing it much lower.

In contrast to these complaints, we cheerfully offer some 1961 Oscars to:

- Pontiac and Lark for making crash padding standard equipment. This we've advocated ever since the padded dash came into being, but so far it has been limited, as standard equipment, to Lincoln, Imperial, and Cadillac.

*Cranks, knobs, and levers
can bring painful injury*

*Windshields moved
back are hazard
for right front
passenger*

*Inadequate
rear visibility*

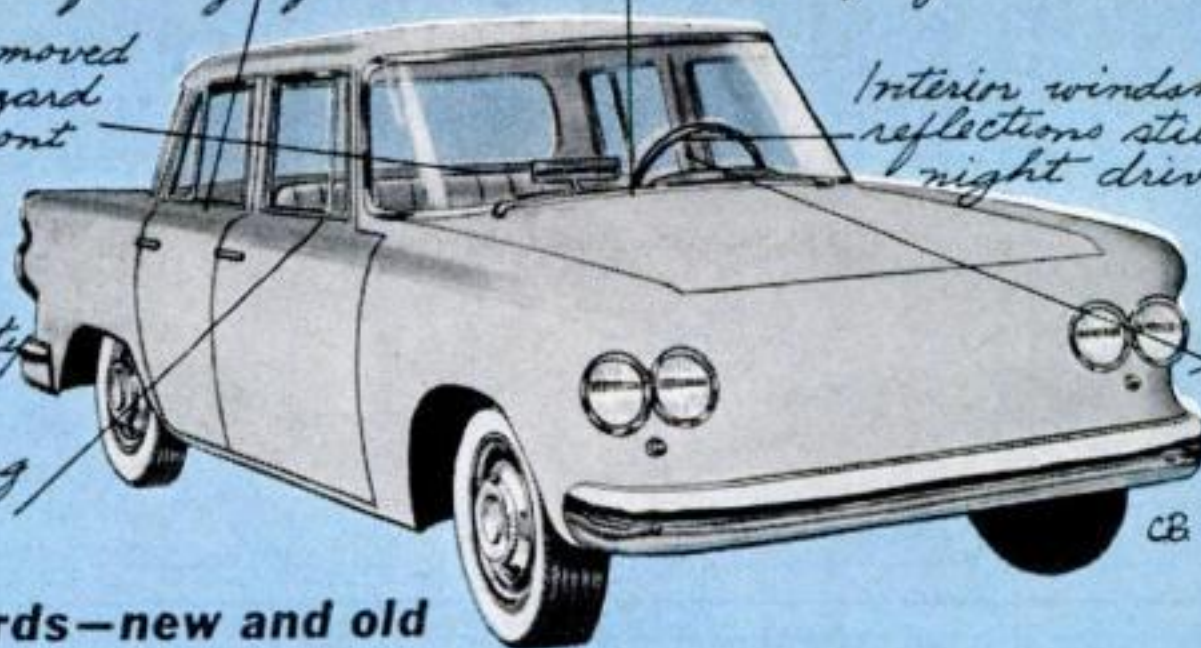
*Chest-busting
front-seat
backs*

Some hazards—new and old

*Tissue dispensers, cooling units,
and record players are new hazards*

*Interior windshield
reflections still plague
night driver*

*Driver
handicapped
by too-low
eye level*



Rates the 1961 Cars

- Imperial for adding crash padding to the lower edge of the dash—a feature pioneered by Lark, incidentally—and to Pontiac for cushioning the entire instrument panel straight across with an impact-absorbing pad.

- Lincoln Continental for its outstanding windshield clearing system (described later); its ingenious compromise between the bucket and the bench seat; and its novel automatic vacuum door-locking system. This secures all doors as soon as the engine is pulling the car at something over three m.p.h.

- Chevrolet for repositioning the gas tank to provide it with greater structural protection in rear-end collisions.

- Rambler for its ceramic-coated exhaust system with its promise of greater security against leaking fumes.

We should also give a nod to Mercury for its new “cushion-link” suspension, plus the car’s total freedom from wind and engine noise—definite fatigue-reducing factors.

In contrast, Mercury’s preoccupation with a vacuum litter-disposal system is depressing. Half of the brain power devoted to this innovation could have relocated that wretched window crank for greater knee protection.

Bucket seat vs. sofa. Lincoln Continental’s new seat design, on the other hand, appears to be a step forward. In a trial ride, it is immediately apparent that the portion of the cushion supporting the hips is much softer than the firm front

edge just behind the knees. This gives an approximation of the bucket-seat feeling in a conventional-looking bench seat. I found little tendency to slide on the seat while cornering.

This looks like progress in a realm that has seen little of it so far. Conceding the problems involved in satisfying a variety of heights, weights, and builds, Detroit still seems to cherish the overstuffed sofa as the proper automobile seat.

Another 1961 car I tried out with interest was the Pontiac Tempest with its four-cylinder, high-output engine; its transaxle, four-wheel independent suspension, and flexible drive shaft. I thought the car gave an admirable account of itself. The “four-banger” seemed surprisingly smooth and responsive; but the transaxle and flexible drive shaft will make no difference in handling that the average motorist will ever notice.

The roll-over danger. As has been repeatedly emphasized in these columns, roll-overs account for some 24 percent of nonpedestrian fatalities. It is reassuring, therefore, to find Dodge engineers so enthusiastic about their new Lancer’s structural strength. They report that it took seven successive roll-overs to cause any measurable weakening of supporting members.

Also heartening to hear is Pontiac’s opinion that their wide-track arrangement has been successful in preventing

[Continued on page 243]

What's Coming in the

.....



Saab

Better performance, a roomier interior, and slicker styling are major changes in the 1961 Saab. Rear window area is increased 117 percent. A bigger luggage compartment and more efficient heating and ventilation are added features of this Swedish front-wheel-drive car. Its price should remain about the same.

BIGGER, faster, better-styled, more luxurious—these are adjectives for next year's crop of foreign cars. Here's what the imports may be offering you for the year 1961.

Volkswagen. Rumors of a new, larger car that will supplement the current top-selling VW crop up persistently. Such a model, if introduced, probably won't appear for several months yet.

Unlike American cars, VWs don't change much from year to year. Small improvements, however, are sneaked in every few months without fanfare. The 1945 model and the current model look amazingly alike, but performance, handling, comfort, and durability are miles apart. Some newly available changes are: the Transporter engine (40 hp. as compared with 36 on the current pas-

senger-car power plant), transmission with all four forward gears synchronized, a manifold preheating device, windshield washer, second sun visor, automatic choke, flexible grab handle, colored steering wheel and running boards, a new gas tank to increase luggage space.

Improved windshield-wiper rubber and a standard-equipment side-view mirror are possible future additions. An improved heater may also be provided for the comfort-sensitive U. S. market.

Renault. Like VW, Renault doesn't retool annually. Some recent modifications that are just appearing on current models are: rear-door safety locks, improved suspension, increased front-seat travel, nylon door catches.

The popularity of automatic transmissions in the U. S. may bring about an automatic clutch such as the Saxomat for export models; the Renault engine is too small to handle a true automatic box.

The Caravelle, Renault's equivalent of the VW Karmann-Ghia, has proved popular in spite of its \$900-higher price tag. It was introduced cautiously at the end of 1959, and supply has lagged far behind demand throughout 1960. Increased production should brighten the situation for this car.

English Ford. There'll be some changes made. The talk inside FoMoCo is that the Prefect may be replaced completely—by a hardtop sports car. Best guess is that it won't appear until early next year. Price: about \$1,800. Anglia, top seller in

Volvo

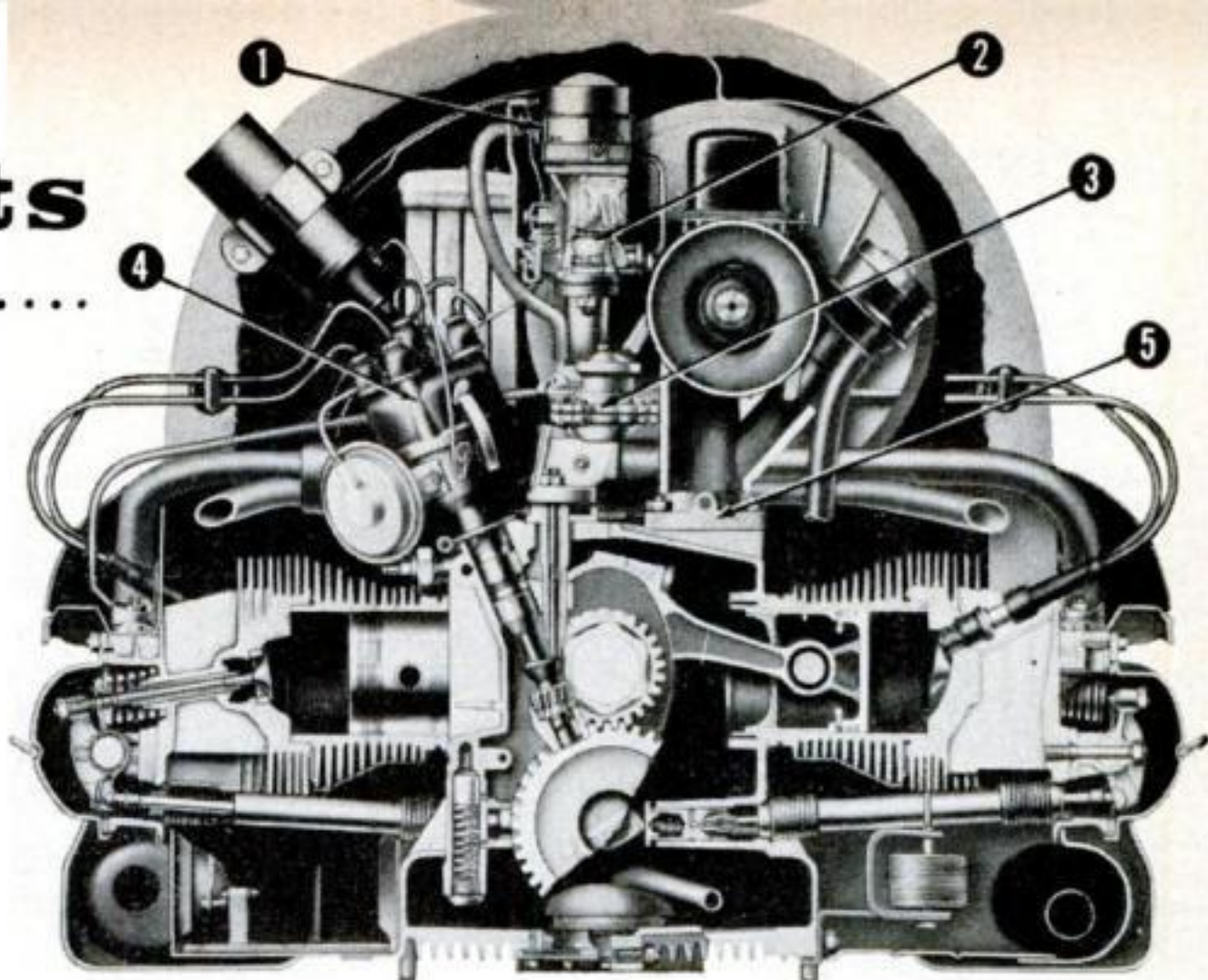


With styling reminiscent of the Ferrari California, and a 1,780-cc. engine that should be capable of 120 m.p.h., the P1800 promises to be a good seller. Cost will be about \$3,800.

Imports

Volkswagen

New VW engine squeezes four extra horses from increased compression, different valves and cam. Other modifications are: 1) Air cleaner with pre-heating to eliminate carb icing; 2) automatic-choke carb; 3) new fuel pump; 4) vacuum-controlled spark advance; 5) detachable generator support.



the line, was redesigned completely for 1960, and should remain virtually unchanged for next year.

The Escort probably will be completely retooled; the flathead engine that the Escort shares with the commercial van line will be replaced by an OHV mill.

A retooled Consul—perhaps named the Mark III—is a good bet. Its highly successful engine should remain basically unchanged, but its 61 hp. may be mildly increased.

Volvo. The new P1800 sport coupe will be available here at the end of 1960 or in early 1961. A 100-hp. machine with a new engine and body, it should be a quick one.

Citroen. By January, either the ID-19 or DS-19 will come out in convertible form.

A VW-sized Citroen, somewhat similar to the ugly-duckling 2CV that never caught on in the U. S. market, should appear within a year. Engine of the new car (possibly called the 3CV) will be slightly more powerful than that of the

2CV. Styling will be considerably more pleasing than the queer-looking 2CV's. It should sell in the \$1,600-1,700 price range, to catch some of the VW-Renault market.

Saab. A new five-passenger car will make its debut next year. The current engine will be hogged out to 842 cc. and horsepower will rise from 38 to 42. Other features: wraparound rear window and reworked dash.

The new Saab station wagon, highly successful in Europe, will hit the U. S. market around October or November.

The Saab GT probably will have a new, stylish body and a 62-hp. engine.

Taunus. A small front-wheel drive car that has been circling FoMoCo's test tracks lately may be the new 1961 Taunus.

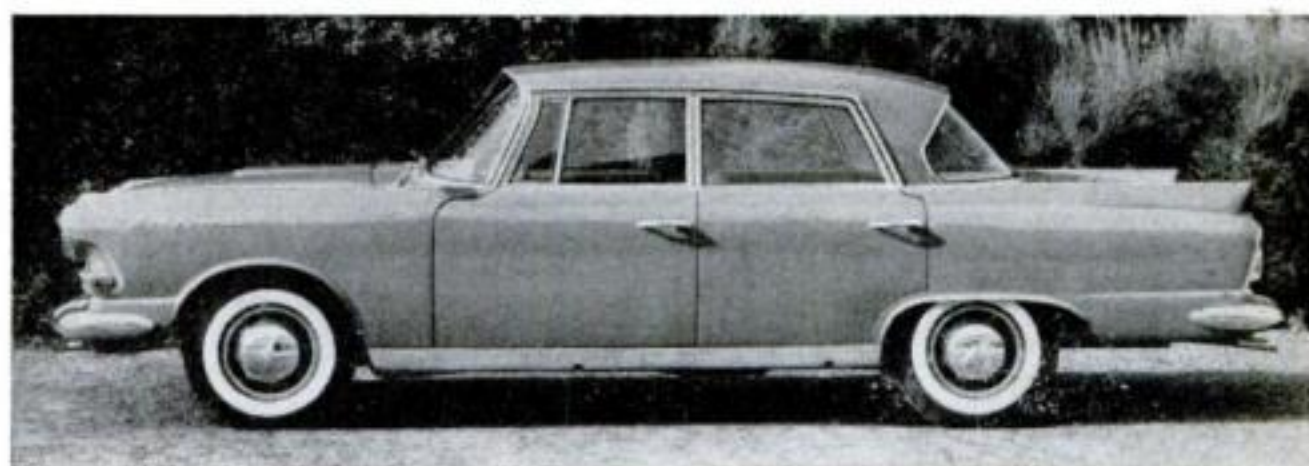
Peugeot. The new, larger 404, now marketed in France, will be introduced April 1 at the New York Auto Show. It will supplement the present 403 model.

Borgward. An optional four-speed, semiautomatic transmission should be

[Continued on page 250]

Borgward

Powered by a 2,240-cc. OHV six, the Big Six will sell for about \$3,995. All forward gears are synchromesh. At 70 m.p.h., fuel consumption measures about 25 m.p.g.





BANANA HAULER can skim over jungle trails and streams at 12-inch altitude. Estimated top

speed: 40 m.p.h. It will carry three men plus cargo, making a total load of about one ton.

Banana truck rides on bubble of air

Hauling bananas in the Southern Cameroons is a problem: bad roads, unreliable rivers, and a cargo that bruises easily. So Elders and Fyffes, Ltd., who own plantations there, ordered a truck-without-wheels to float their fruit out of the jungle on a bubble of air.

The first model (above) gets its air bubble in a way that may lead to cheaper, more effective wheel-less vehicles. Instead of a central fan blowing air through costly ducts to the edge of the body, it

has fan blades at the edge to push air straight down, as shown in the drawing on the facing page. The fan has no hub—just two concentric rings connected by blades. The rings, riding on rollers, are spun by a friction drive. The outer ring is so large (about 18 feet in diameter) that its edge spins at 240 m.p.h.

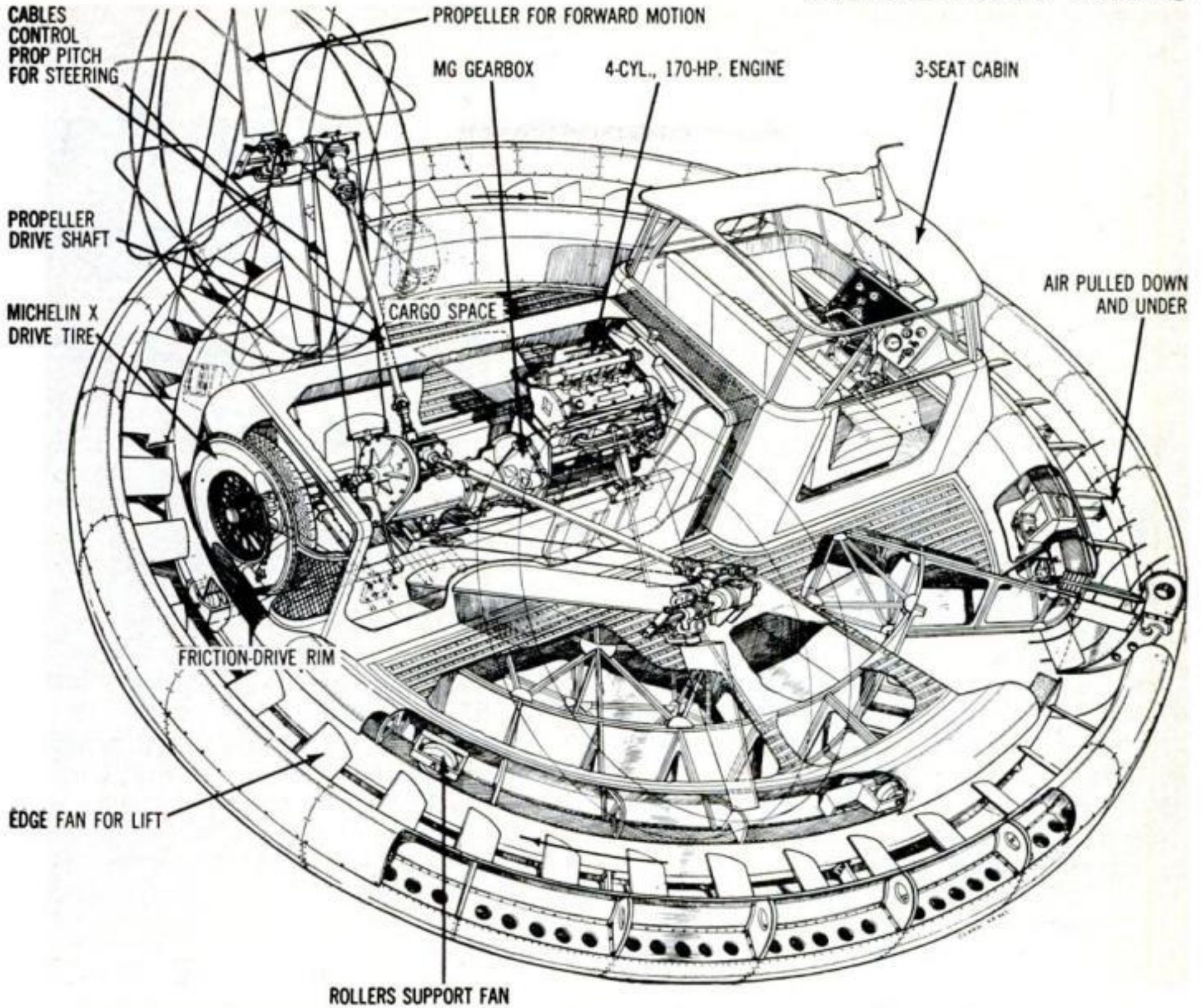
The same engine that spins the fan also powers two propellers to scoot the Cushioncraft forward. Britten-Norman, Ltd., of Britain, built it.



Solar generator to circle earth

A 1,500-watt solar generator will furnish power for space satellites by converting energy from the sun into electricity.

It will contain about 7,000 four-inch aluminum reflectors like those in the six-bank test model at left. They will concentrate sunlight on collectors in their centers, producing heat of 1,000 degrees at the hot end of a thermocouple. Hamilton Standard is building it for the Air Force. For ground-testing, a 100-watt, 900-reflector model will be made first.



TRICKY DRIVE SYSTEM is shown in cutaway from British journal, *The Aeroplane*. Car wheel, spun

by a sports-car engine, presses against rim of the fan to turn it. The fan rides on rollers.



ODD LANDING GEAR on the Canadian Otter was devised to simulate a tricycle gear cheaply.

Four-wheel landing gear

Canada's de Havilland Otter, already noted for short takeoffs and landings, has become even more STOL after a four-year guinea-pig stint. As shown above, it has been fitted with big and



FLAPS DOWN, the Otter makes a low-level flight over an airfield at a slow 42 m.p.h.

powerful wing flaps and a new tail that rides high. The angled horizontal "butterfly" tail surfaces allow the airplane to clear air swirls set up by the big flaps. The unusual landing gear—substitute for costly tricycle gear—gives good air flow over the tail for control on the ground.

Along flyways as crowded as a Sunday turnpike, migrating birds travel up to 25,000 miles a year. Here's what we're now learning about—

How Birds Find Their Way in the Sky

By Wesley S. Griswold

MEN peering through field telescopes at the bright face of October's full moon have occasionally caught glimpses of an eternal marvel not more than 3,000 feet above their heads. That shining disk has spotlighted for them a small portion of the stupendous southward flights of birds that take place every year at this season.

Watchers have counted as many as 9,000 birds an hour streaming past the moon. From that tiny illuminated sampling they have estimated that in the same hour hundreds of thousands of travelers were winging south.

Few of us ever see this spectacular show. That's because most of it takes place in the dark. Be they bluebird or bobolink, robin or wren, most migrant

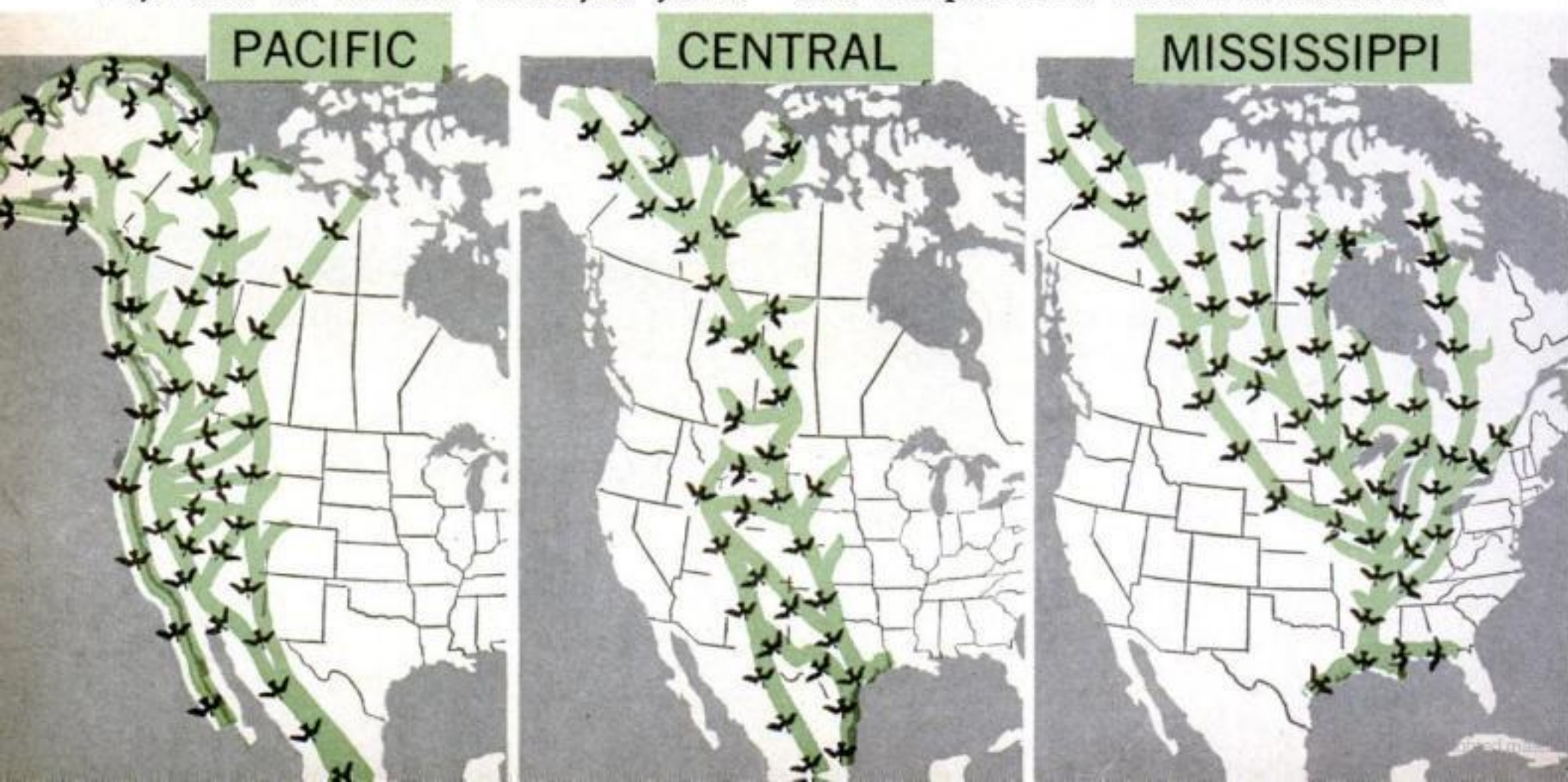
birds favor flying between eight p.m. and midnight, and between four and six in the morning.

Celestial navigation. How birds perform their twice-a-year feats of long-distance night flying has mystified men for ages. The explanation used to be that they have a "marvelous sense of direction." That is unquestionably true, but not specific enough to suit scientists. Besides, radar has demonstrated that when birds run into heavy clouds or fog, they can lose their sense of direction and mill about in confusion.

But now a 35-year-old German scientist from the University of Freiburg thinks he has the answer. After careful study of European warblers, Dr. E. G. F. Sauer puts forward the astonishing theory that these birds navigate by the stars. He concludes that they (and other

FLYWAYS, plotted by Frederick Lincoln of the U. S. Fish & Wildlife Service, are the sky highways birds use on their twice-a-year jaunts.

Heaviest travel in the Western Hemisphere is along the Mississippi Flyway, popular with birds who push on to the Gulf of Mexico and



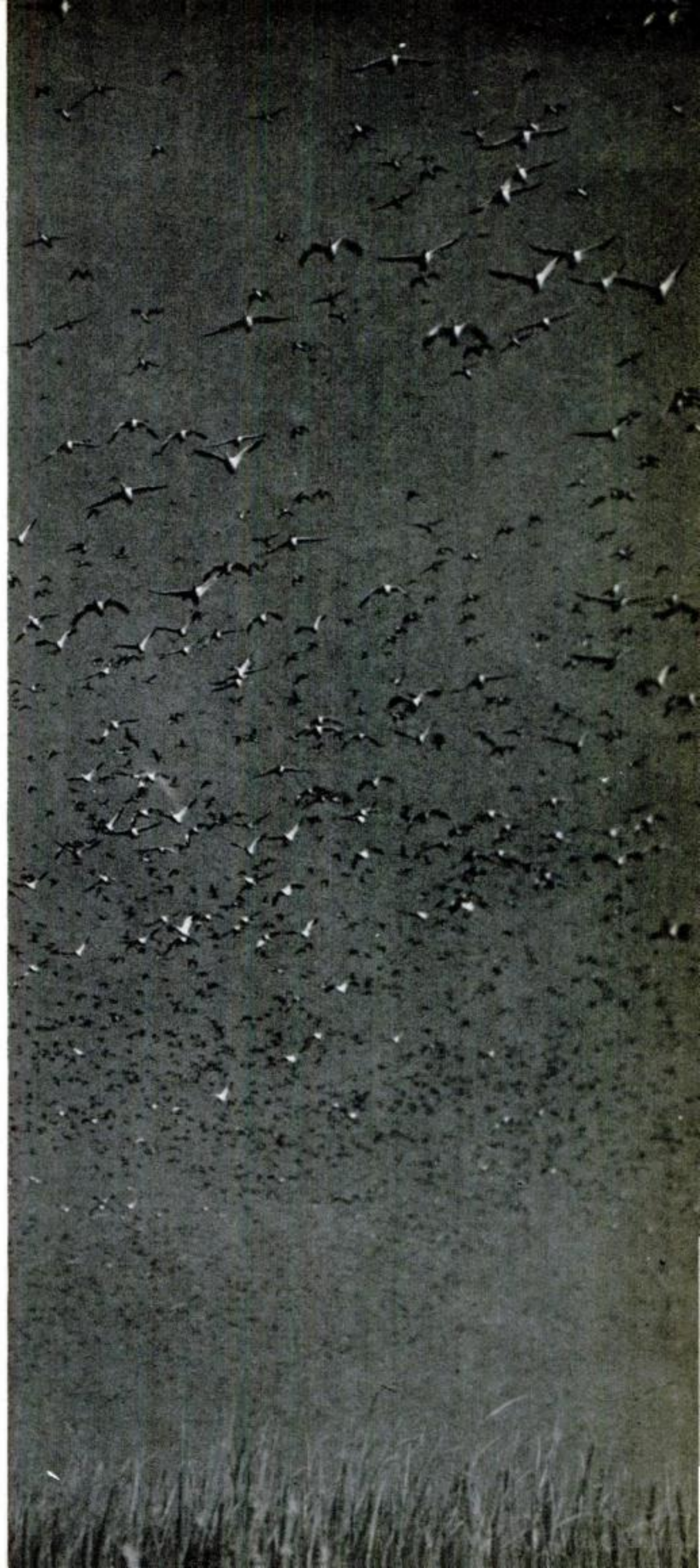
night flyers) are born with an instinctive knowledge of a map of the stars, plus the ability to relate it precisely to the season and to where they are on earth.

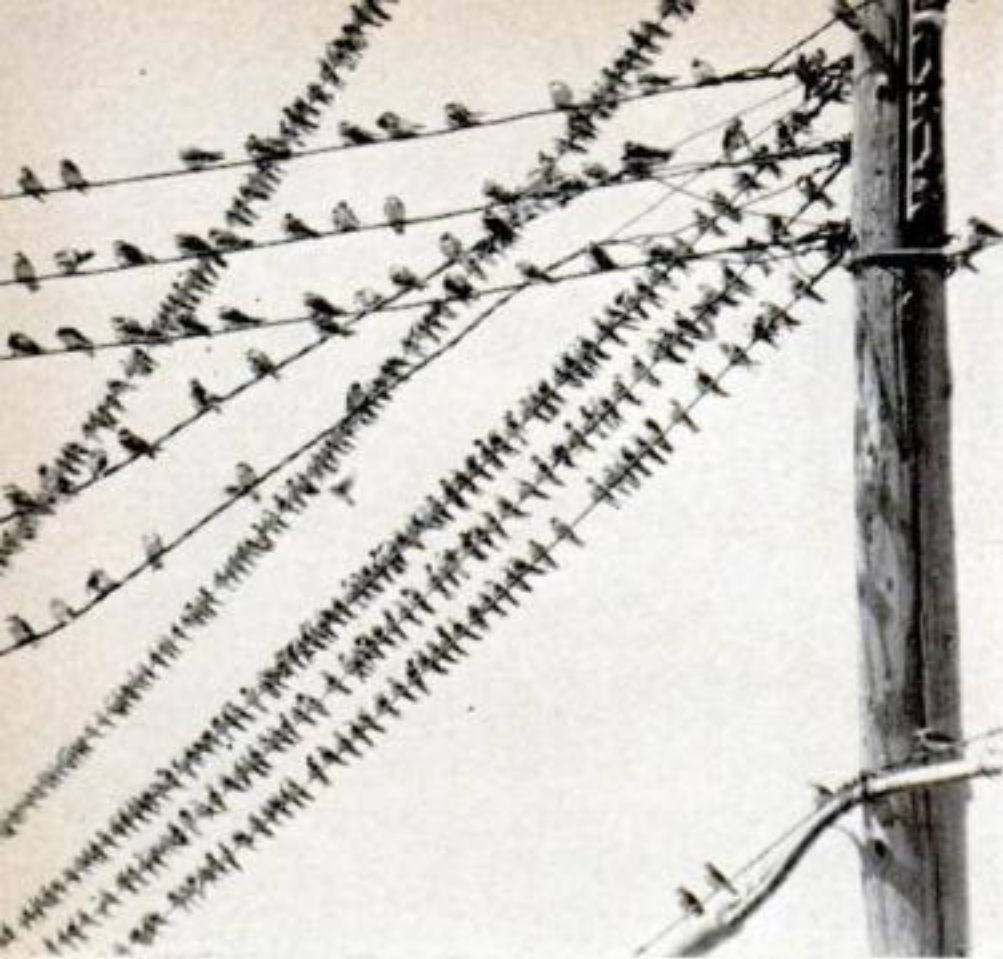
Birds can navigate by the sun, too. During the past 10 years, English and German scientists have proved that homing pigeons and starlings relate the sun's slowly changing position in the sky to the direction where they want to go. Daytime migrants can plot their course this way, as can night birds, resting or foraging for food.

"Flyways." While European scientists explore birds' navigation gear, an American has already answered another navigation question: Do birds flock to a few major routes once they know where they're going?—Are there highways in the sky? Yes, says Frederick C. Lincoln of the U. S. Fish & Wildlife Service. In 1935, after long study of banding data, he identified four major "flyways" for birds

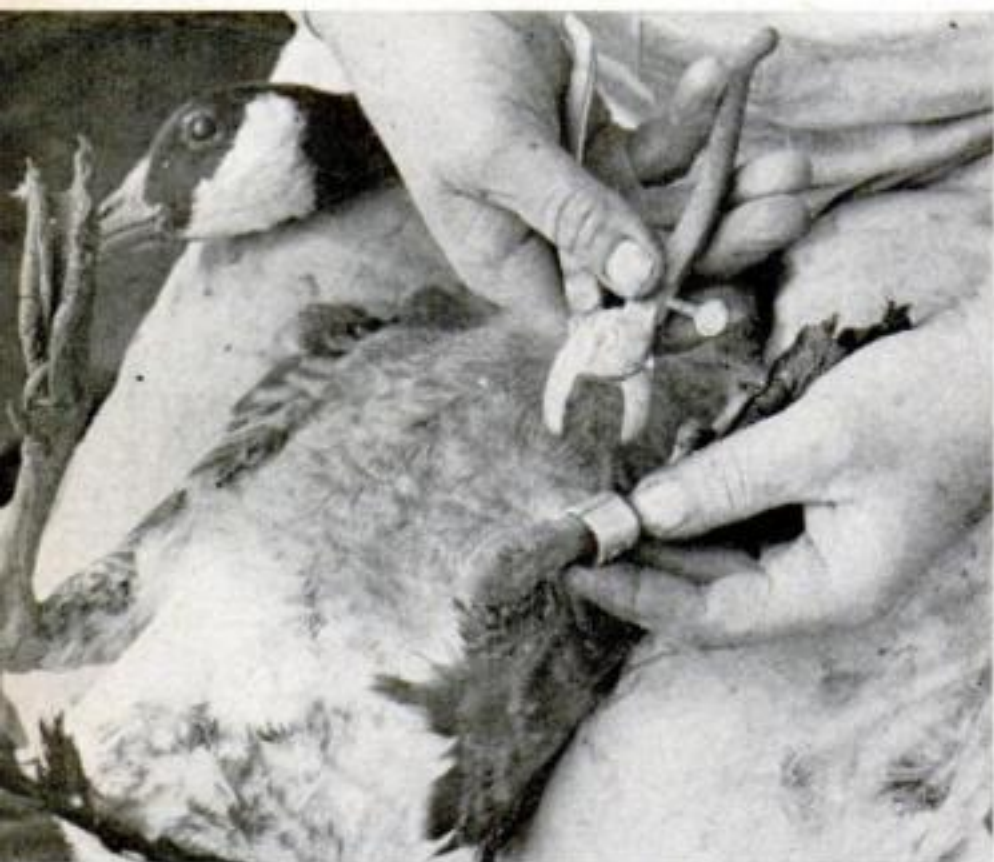
points south. The Canadian ducks and geese in photo at right pick the Pacific route.

ATLANTIC





BATTALIONS OF TREE SWALLOWS form up along telegraph wires en route to winter quarters. Specialists now think that the birds, daytime flyers, plot their course by the sun.



IT DOESN'T HURT A BIT: A Canada goose sits patiently while its leg band is fastened. Key data on species, date, and place of banding are coded on the identification anklet.

in this hemisphere. He named them the Atlantic (coastal), Mississippi, Central (eastern slope of the Rockies), and Pacific (coastal) Flyways.

Traffic is heaviest on the Mississippi flyway. Many of its millions of travelers, including the tiny ruby-throated hummingbird, push on across the Gulf of Mexico to Central America and beyond.

Other distance travelers include the barn swallow, who winters in Brazil; the bobolink, who hops from Florida to Cuba to Jamaica to Venezuela and parts south;

and the Atlantic golden plover, who flies nonstop from Nova Scotia to northern South America, covering 2,400 miles in 48 hours (an average 50 m.p.h.), and winds up way down in Argentina.

But the greatest long-distance flyer of them all is the Arctic tern. This bird breeds as far north as feasible, and then migrates almost to the bottom of the world for the winter. It covers at least 25,000 miles in its round trips.

What sets them moving? People used to think it was nippy weather that drove birds south. Experts now know that the reason is more complex. Some birds leave northern points as early as mid-July. Others hang around until there's snow on the ground. Chickadees never leave at all.

In general, those with the longest journeys make the earliest departures. But for the most part, the migration timetable depends on the food supply. As the days shorten, there are fewer hours in which to find edibles. As the temperature drops, summer insects begin to die off or hibernate. This, not chilliness, starts insect-eating birds on their way to tropical lands. The seed-eaters soon follow, though some wait until the first snowstorm buries their forage.

The chickadee is a stay-at-home because it feeds entirely in trees, where there's usually something to eat all year.

No "togetherness." Food is more important than sex at fall migration time. Few males and females travel together. Ducks are an exception. They take the whole family along, instinctively flying in V formation. With a wise old drake out in front, this makes it easier to keep tabs on everyone.

Parents of perching birds drive their youngsters from the nests as soon as they can fly. The small fry, smarting with resentment, get together and fly south by themselves, ahead of the old folks.

The frivolous female phalarope heads south as soon as she has laid her eggs. She leaves her mate to hatch them, take care of the young, and follow her whenever he can break away from his tedious domestic round.

Steady as they go. While the southward trek allows no dawdling, birds don't break any speed records, either. Most fly at the leisurely pace at which they hunt food. For the little birds we're most fa-

[\[Continued on page 224\]](#)

"I'd like to see them make..."



A SPLIT LID FOR CAR TRUNKS. If hinged at each side, the trunk would take bulkier items or, with

a canvas enclosure, form a box bed.—*Starr Moshier, Rochester, N.Y.*



A POWER-DRIVEN VIBRATING BRUSH for removing old wallpaper that has been painted over or is otherwise stubbornly unaffected by soaking.—*Ralph T. Stewart, Winston-Salem, N.C.*



THERMOS-BOTTLE GIRDLES of hard rubber. Slipped over a bottle, they'd add corners to keep it from rolling off a table or bench and smashing the lining.—*F. M. Scott, Leonia, N.J.*



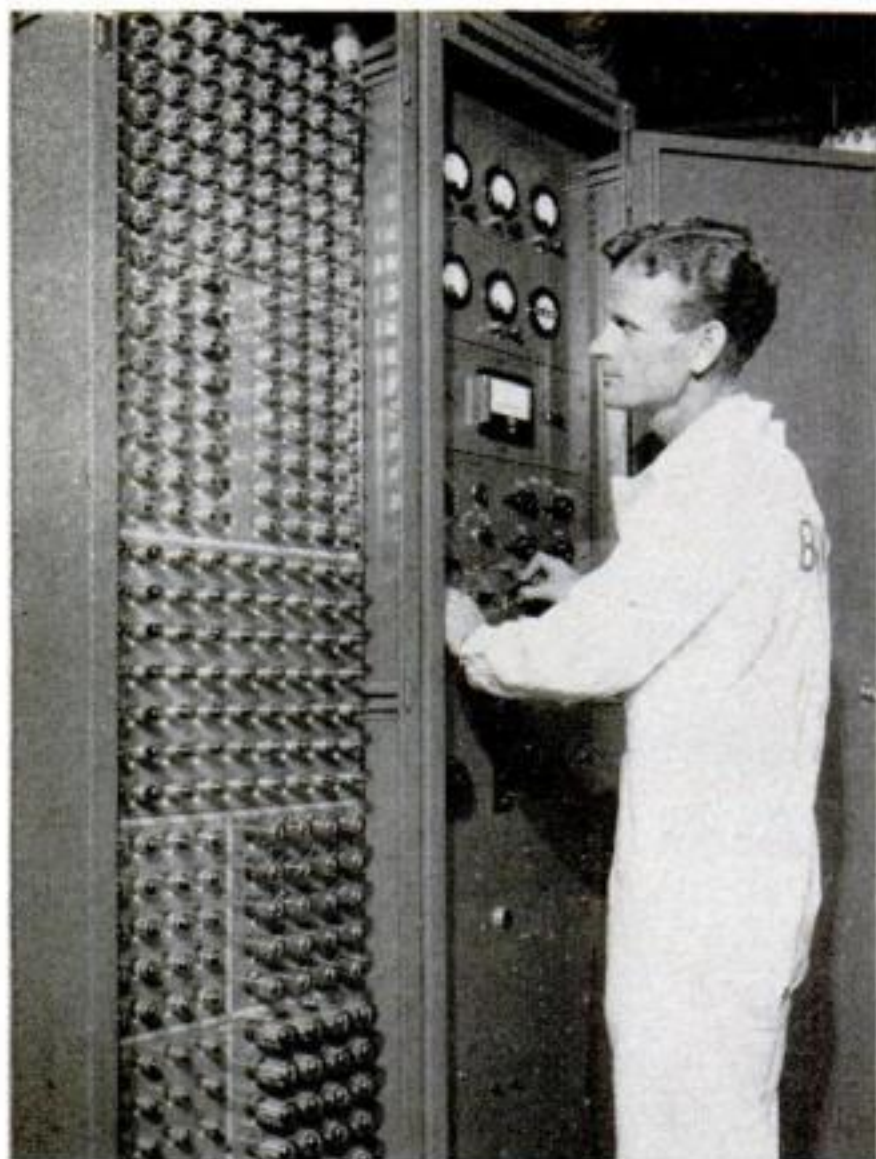
ORNAMENTAL SHUTTER LATCHES of black plastic instead of wrought iron. They wouldn't rust and streak stains over the siding as metal ones do.—*J. E. Weber, Chevy Chase, Md.*



FLAT APPLIANCE CORDS for outdoor equipment. With adhesive on one side, they'd stick to a wall or patio floor, be safer, and look neater.—*Richard Hughes, Pompano Beach, Fla.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's

yours? We will pay \$5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



Tubes aged in the glass

The 300 tubes in this bank are being put through operating conditions for 200 to 400 hours before going into use. Reason: Boeing has discovered that most defects in tubes running its automated machines show up in the first 400 hours of operation. After aging, they are good for 5,000 to 10,000 hours.



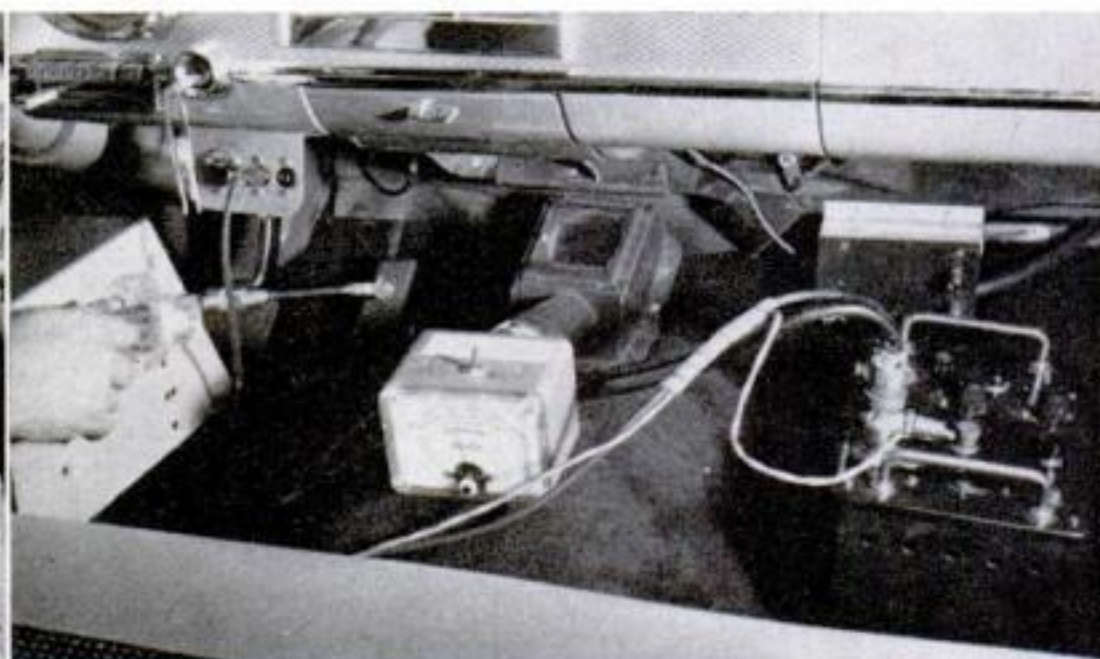
What's under the bridge

Pedestrians and bicyclists who use the lower level of a new bridge near Munich in West Germany get a view of the Mangfall Valley below through a huge elliptical cutout that divides its two lanes. Autos use the solid upper level. The unusual bridge was completed in 20 months at a cost of more than \$1,500,000.

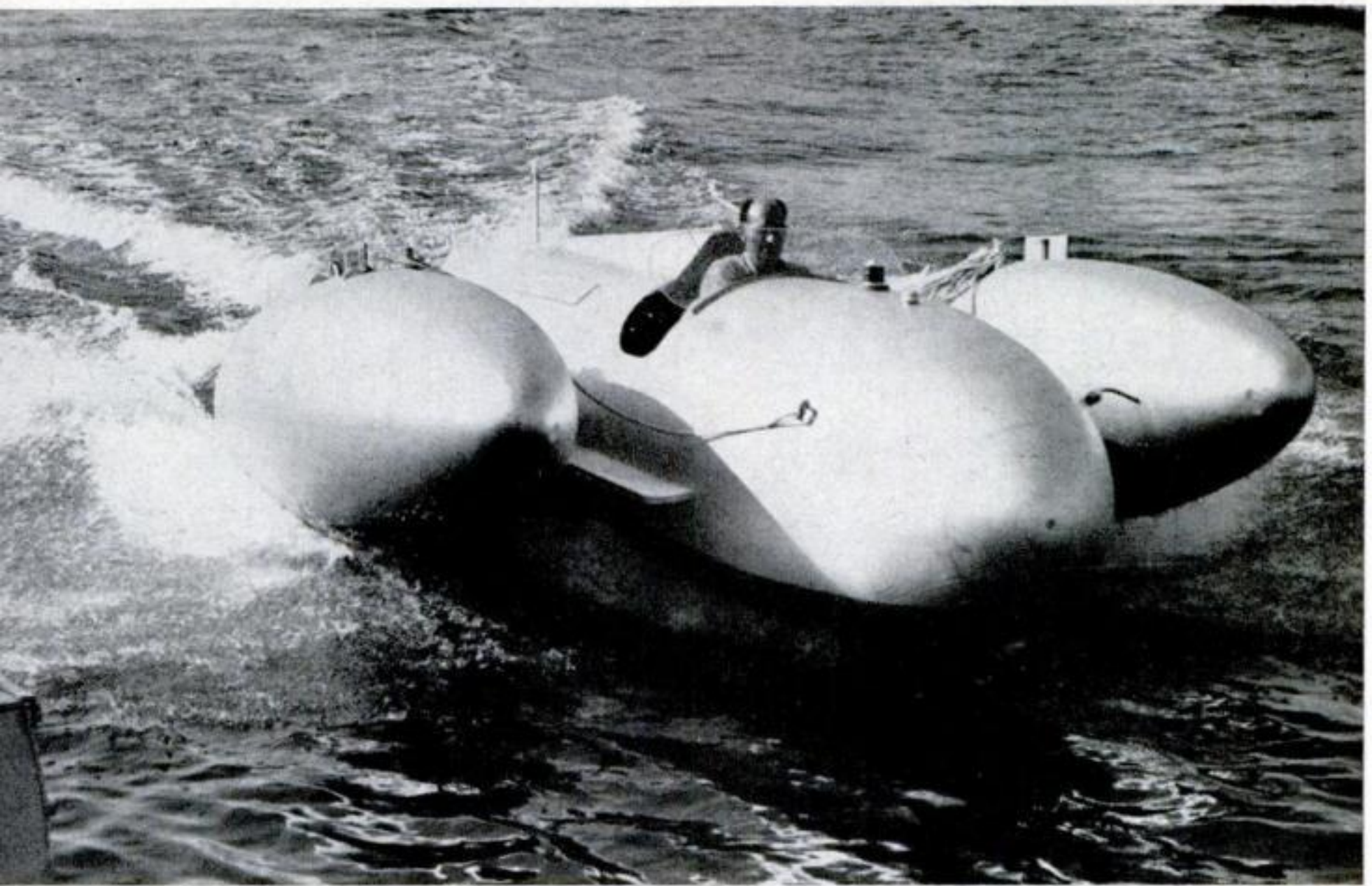
Highway travel by tape recording



RECORDING INSTRUMENTS installed in a pilot car make a faithful reproduction on tape of acceleration, speeds, and grades on highways.



REPRODUCTION EQUIPMENT connected to test car's controls plays back tape to simulate traffic and highway conditions encountered in travel.



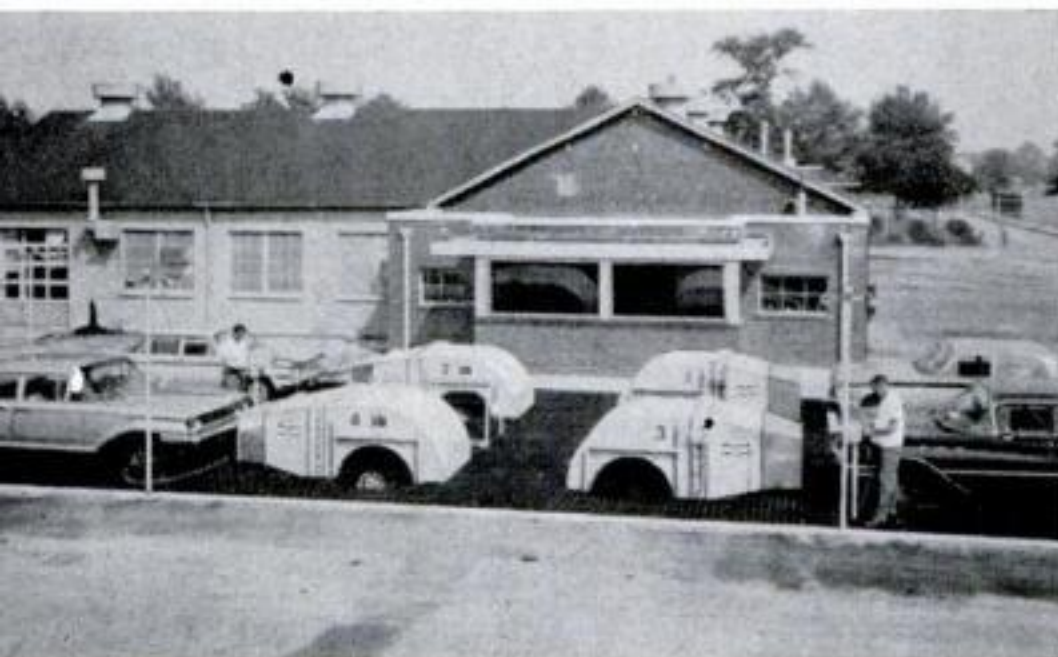
Floating wing tanks ride the waves

This outrigger motorboat not only floats—it makes a speedy 25 knots in a rough sea. It was built by Bill Wheeler of Coral Gables, Fla., entirely from junk: three wing tanks salvaged from U. S.

bombers. Wheeler cut an opening and put a seat and an old inboard motor in the largest, a 25-footer. Then he mounted two smaller ones on swivel bars for pontoons that ride up and down on the waves.

ing from bumper-to-bumper traffic to open-highway driving. On playback in robot-controlled cars mounted on treadmills, they simulate the exact accelera-

tion and braking patterns that are used on actual runs. Such standardized testing enables researchers to analyze performance of new fuels and oils.



DRIVERLESS TEST CARS are mounted on treadmills. They travel hundreds of miles on taped controls without actually moving even an inch.



CONTROL PANEL in Socony Mobil lab lets one man put four cars through their paces in tests of experimental gasolines and lubricants.

When Will We Start Burning Water?

**The hope: unlimited power.
The fuel: water. The date:
not tomorrow . . . but soon**

By Harland Manchester

ABOUT 1,000 scientists and engineers in eight countries are now designing, building, and testing a variety of strange new machines in a race to solve one of the most inspiring and baffling riddles man has ever put his mind to—how to harness the fusion might of the hydrogen bomb and convert the killer into a docile engine that will produce power unlimited from water.

The basic facts behind this ambitious plan seem quite simple. All water contains a minute bit of "heavy water," compounded of an isotope of hydrogen that has an extra particle in its nucleus. These special atoms, as scarce as four-leaf clovers, constitute about 1/6,000 of water everywhere. Yet there are enough of them in a glass of ordinary water—if combined under certain conditions in a reactor—to supply energy sufficient to drive a car 400 miles or to provide electricity for an average American house for a month. If all the heavy water in the world's oceans, lakes, and streams were converted into power, it would equal the energy of about 17,500 billion billion gallons of gasoline, or supply all the world's needs for 10 billion years or so. This super-fuel, which looks like ordinary water and is only a little heavier, should be dirt cheap if extracted in bulk.

Deuterium plant concentrates the one part heavy water present in 6,000 parts river water by complex chemical, electrical, and distillation processes. Electrolysis separates heavy water (D₂O) into deuterium and oxygen

Deuterium gas to be added to fuel mixture

Water-treatment plant

DONALD J. FINE

A fusion reactor could not, of course, operate on heavy water in its watery form, any more than car engines run on petroleum. From heavy water it is easy to extract the actual fuel, the "heavy hydrogen" that is called deuterium. The deuterium would be "burned" in gaseous form in a fusion reactor to make electricity. In existing atomic plants operated by fission, the giant nuclei of uranium-235 atoms are smashed into small fragments, and some leftover matter is converted into energy. In a fusion plant two tiny deuterium atoms would be combined to make one atom of helium with a far greater conversion of unused mass into energy. This is no guesswork: The sun and millions of other stars have been doing it since time began, and life on earth is made possible by the great solar thermonuclear fusion plant.

Scaled down to earthly size, such a plant could heat steam to drive turbines, as do today's atomic plants; but scientists believe that fusion offers a much better chance of converting energy directly into electricity, eliminating the cumbersome steam cycle.

force of gravity acts as the furnace wall. Since scientists can't build a sun-size reactor, they have adopted another invisible barrier—a magnetic field that cages the hot fuel and keeps it away from the metal reactor shell. In a sense, it does the job of the heat-resistant brick lining used to insulate furnace fireboxes. Already, temperatures of 10,000,000 degrees have been reported in such experimental reactors, and scientists hope that this intangible lining will provide the necessary container.

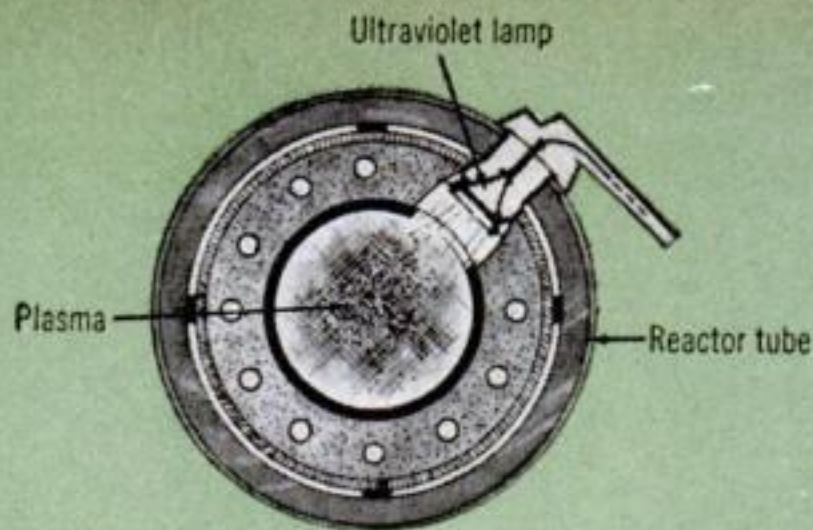
These magnetic bottles, or "cages," have been made in many designs in laboratories all over the world. But they are driving scientists crazy with their erratic behavior. Their walls have holes in them through which particles may escape. Said Dr. Edward Teller, sometimes referred to as senior statesman of thermonuclear fusion:

"It's as though the walls and ceilings of this room were lined with a layer of water held in place by pressure. If you disturb it, globules will break loose, and soon the lining will collapse."

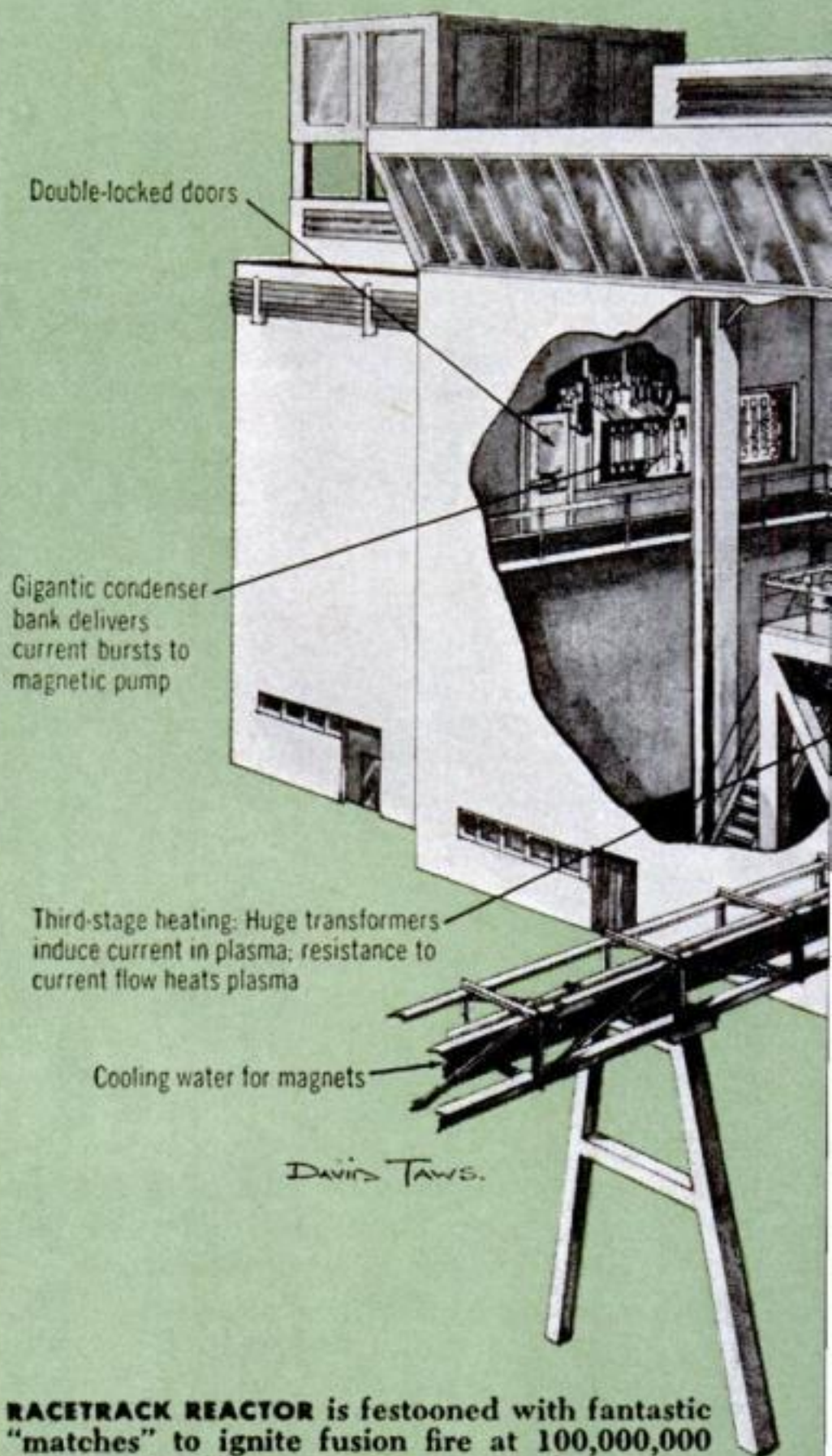
If this happens, the fuel will cool off, ruining the reaction. Or a small kink may develop in the magnetic cage. Like the wobble of a spinning top, it grows rapidly once it starts and the reaction stops. This has been a problem with all reactors, and a Russian physicist at the Geneva conference two years ago proposed a toast "to stability." Devices of many types have been built to prevent the wobble, and Dr. Teller reports that one machine in California has solved the problem.

There are many other headaches. In order to smash the deuterium atoms together hard enough to fuse them, you first have to peel off their outer shells of electrons to get bare nuclei; otherwise they cannot be forced close enough together to fuse. The actual fuel, therefore, is an ionized gas called a "plasma"—one of the key words of the whole campaign. About 99 percent of the universe is composed of such plasma—the sun, the stars, and much of space. It makes up the ionosphere. The conducting gases in neon and fluorescent lamps are plasmas, and they have been used for years in several electronic tubes. Many scientists are studying the whole nature of this fourth state of matter as an initial step to the

[Continued on page 240]

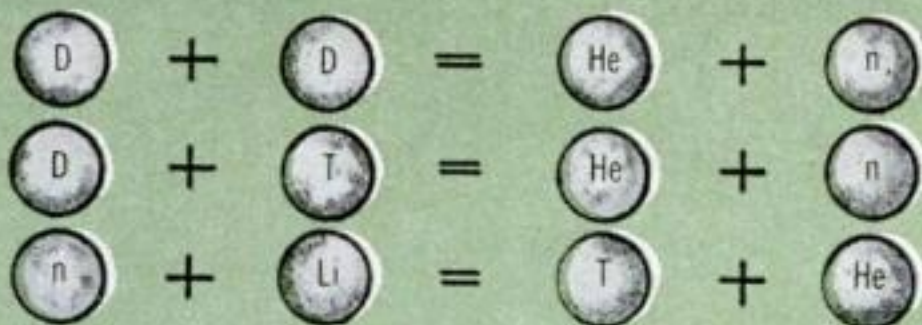


First-stage heating: Ultraviolet light ionizes deuterium and tritium into plasma, peeling off electrons to leave electrically charged nuclei of atoms



RACETRACK REACTOR is festooned with fantastic "matches" to ignite fusion fire at 100,000,000 degrees. It makes part of its own fuel—neutrons from reaction transform lithium into tritium. This type—Stellarator—would generate electricity by making steam, like oil furnace. Others might convert fusion energy directly to electricity. This is an artist's conception.

Two fusion reactions merge atomic nuclei to produce new kind of nucleus (helium) and neutron. Loss of weight is transformed into speed of neutron. This becomes heat when water (in steam tubes) slows neutron. Third reaction generates fuel by using some neutrons to split lithium into tritium and helium



Fourth-stage heating: Magnetic pump uses rapidly reversing current in coils to compress and expand plasma. Gases heat when compressed. This device should bring plasma to 100,000,000-degree fusion point

Second-stage heating: Alternating electric field increases ionization of plasma

Spark-gap switch

Control room

Power for heating transformers

Vacuum pumps

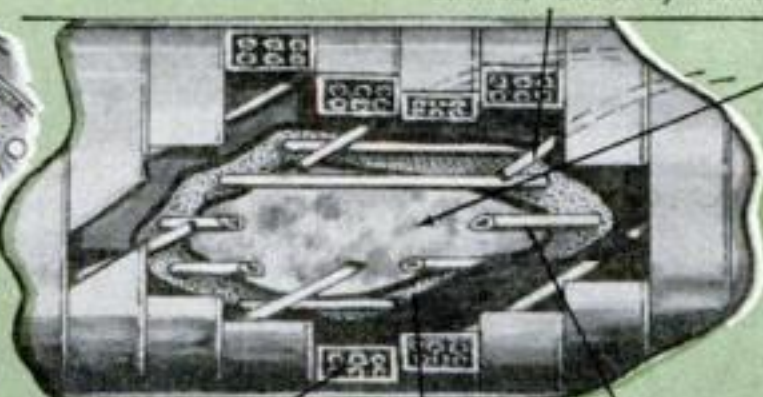
Diverter skims off plasma particles that get too close to tube wall. It alters magnetic field so that outside lines of force curve out into trap, carrying maverick particles with them.

Supporting framework of thick stainless-steel plate

Corkscrew coils make magnetic lines of force spiral. This keeps plasma particles twisting around lines of force (like rope strands)—and away from tube wall



Water-cooled coils generate magnetism that squeezes plasma toward center of tube



Blanket of lithium

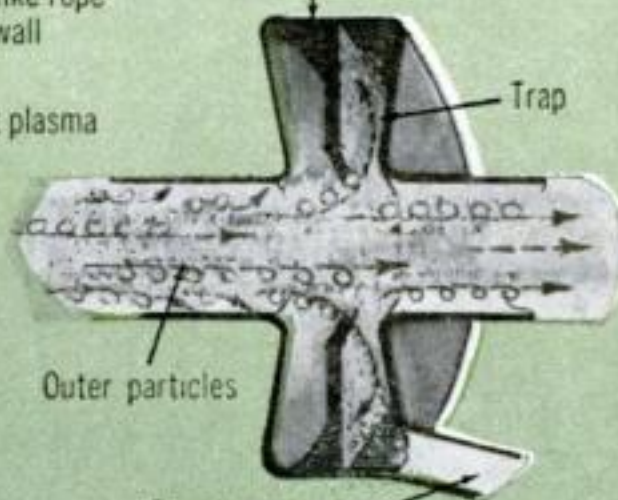
Steam tubes

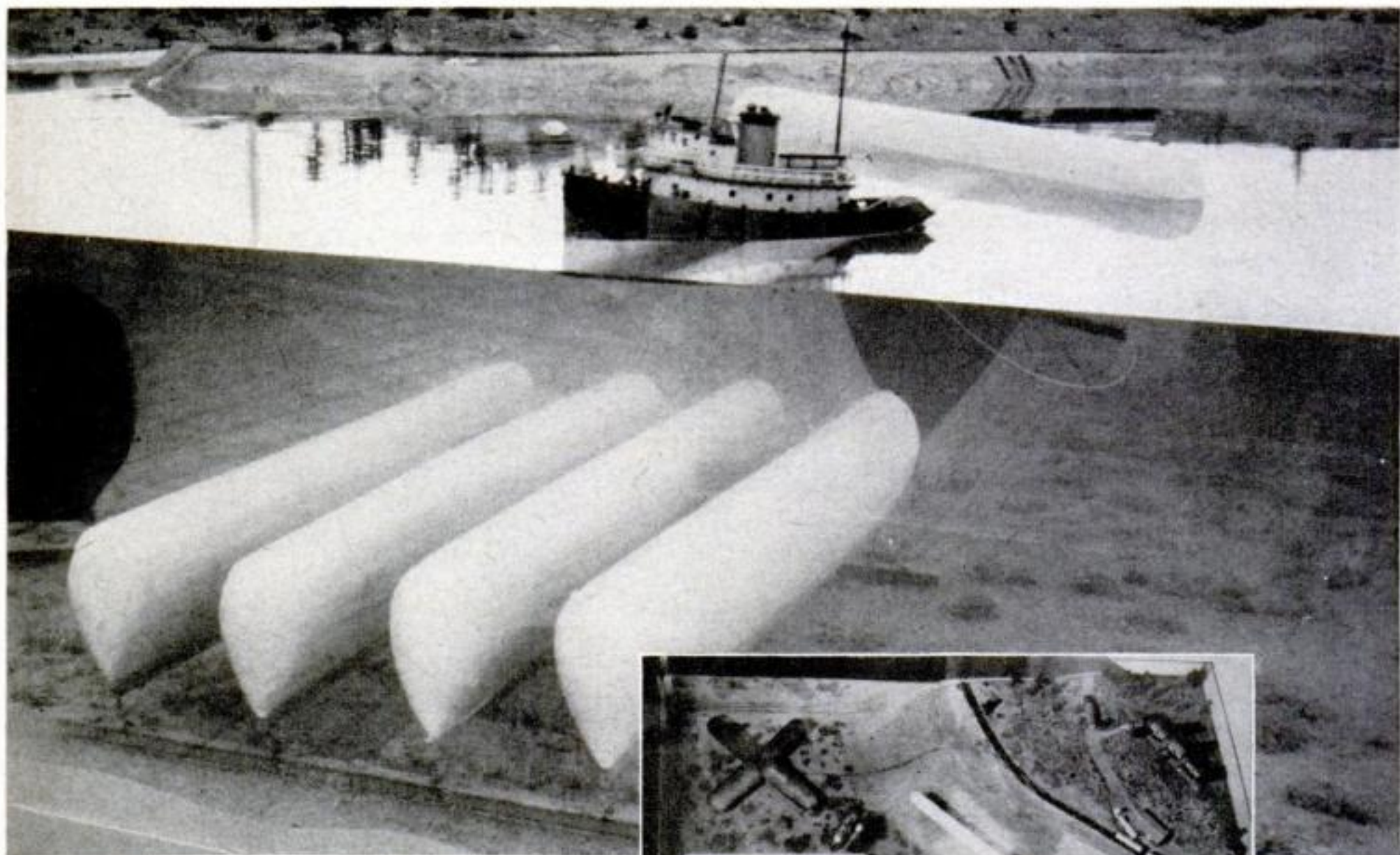
Hot plasma

Outer particles

Trap

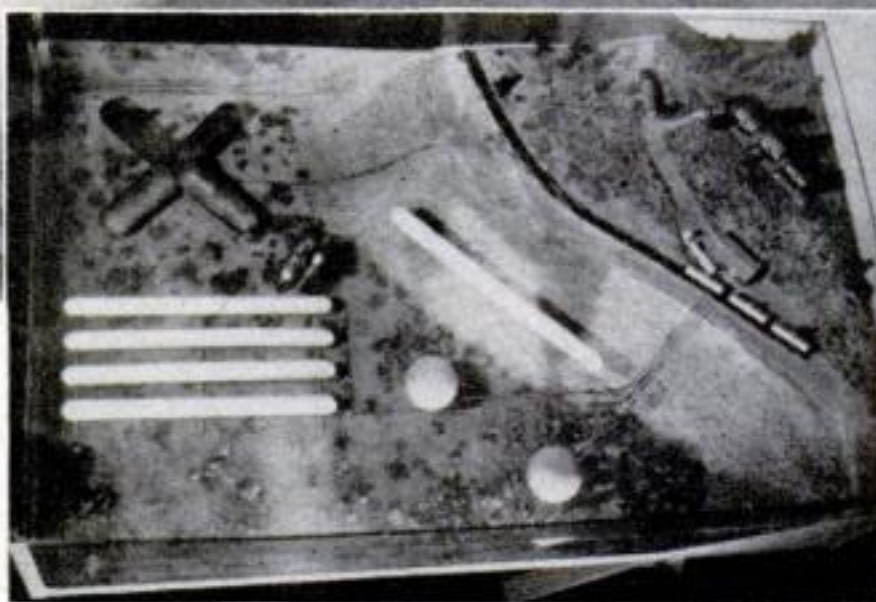
To vacuum pump





Model shows tanks anchored to floor of sea.

PLAN VIEW of model illustrates the various methods of placement. Round tanks, at right in photo, are tapered at bottom like balloons. The two at St. Petersburg Beach resemble those at upper left, but are placed parallel.



SHORE TEST of Firestone neoprene-nylon tank shows tapered shape and valve through which it is filled. The edge in foreground is fastened to channel steel anchored to the sea floor.



Storage tanks on the sea floor

Three huge rubber-and-fabric containers have been anchored to the floor of the Gulf of Mexico to store emergency supplies. Two of them, holding 10,000 gallons each, are 300 feet off St. Petersburg Beach, Fla. One contains fuel oil, the other fresh water for use in case hurricane or flood contaminates the city's usual supply.



Seeing-eye drawbridge

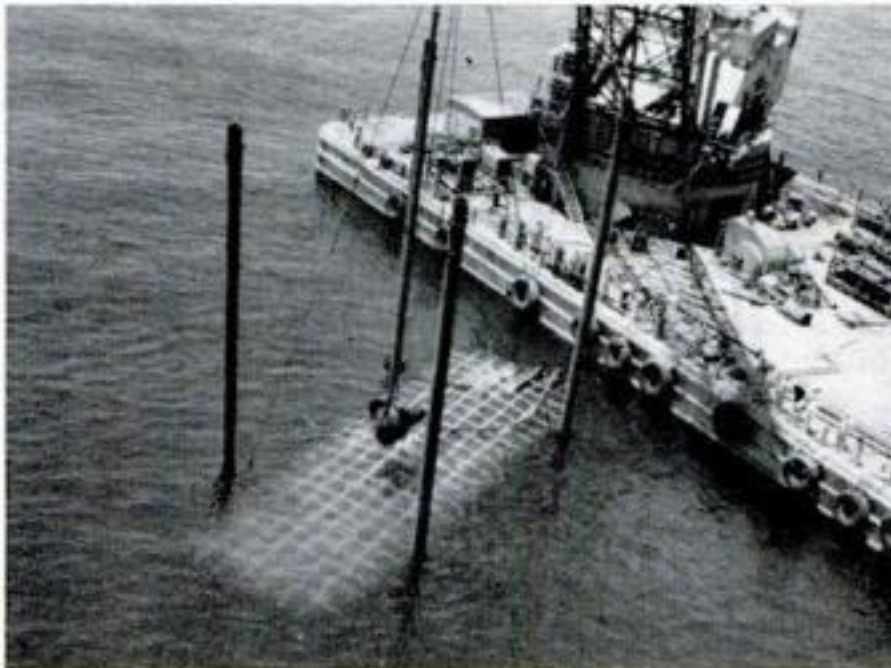
Fog-piercing radar now warns attendants on this Duluth, Minn., bridge of the approach of a ship in heavy weather before it can be seen. They then raise the bridge to let it pass. The radar is on the roof of the control room on the lift span. It was installed by Raytheon when opening of the St. Lawrence Seaway caused an influx of deep-sea vessels.



1. DEFLATED NAVY CONTAINER is shown strapped to frame on barge. Piles near corners will be driven through sleeves to anchor it.



2. SWUNG OUT OVER WATER, the still-deflated U. S. Rubber envelope is positioned by a giant crane before being lowered to sea bottom.



3. CONTAINER SINKS UNDER WAVES, followed by valve at center with connected flexible hose.



4. DRAWING SHOWS TANK anchored to bottom with swivel valve and fuel-transfer float above.

The third undersea tank, a 50,000-gal. whopper, is being tested by the Navy for refueling ships in the Bay Marchand oil fields off the Louisiana coast.

The Navy installation may lead eventually to underwater refueling stations at strategic spots over the world. The tank is a 22-by-70 foot U.S. Rubber envelope; when filled, it's six feet deep. Harnessed in a steel frame, the tank is lowered into the sea and anchored with 80-foot steel piles driven into the floor through sleeves in the frame. Filling and

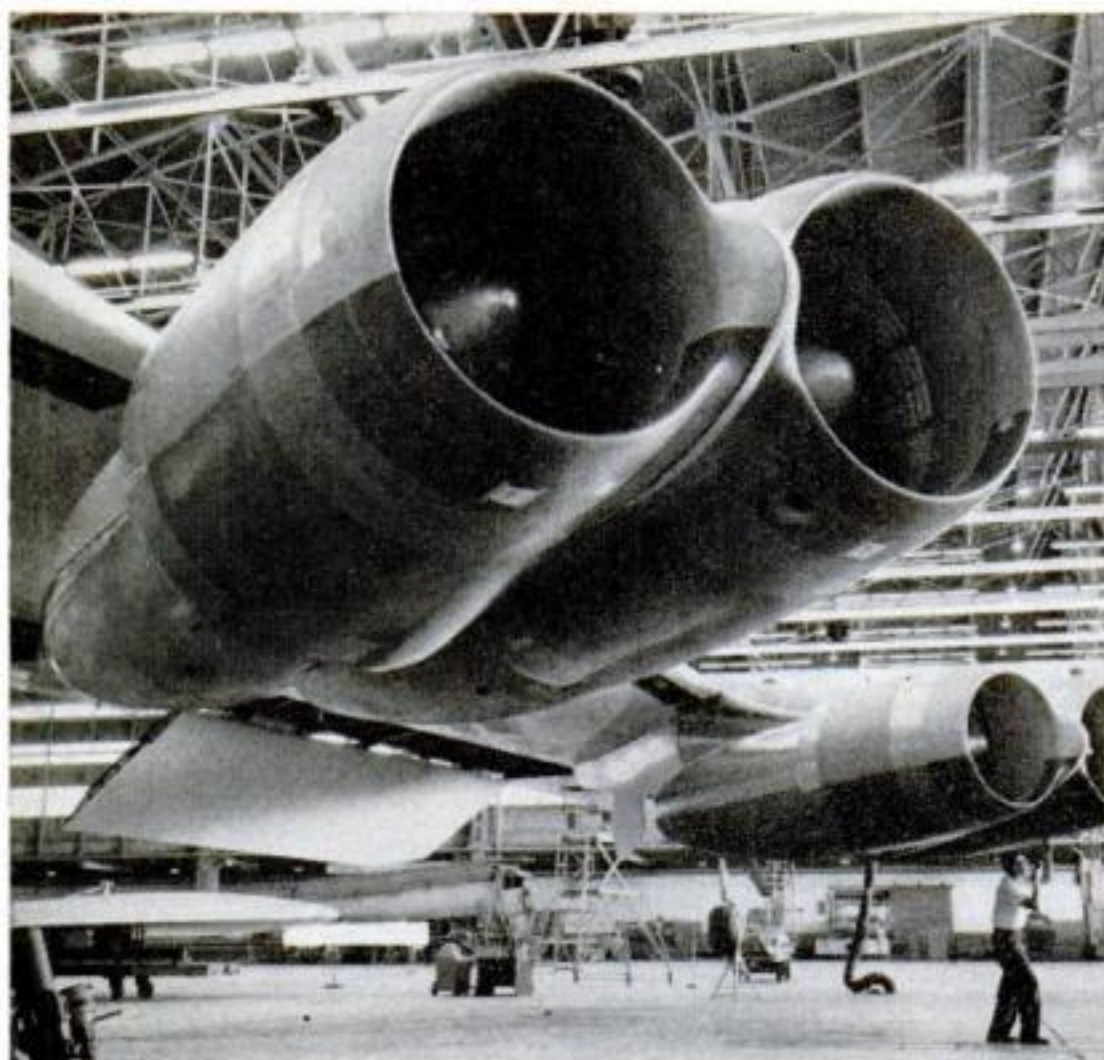
discharging are through a six-inch flexible hose connected to a buoy on the surface. A pressure device on the buoy signals when the tank is full.

The St. Petersburg Beach storage tanks were made by Firestone for the Jet Fuel and Storage Co., of Washington, D. C. They are held to the bottom by one edge on swivel fasteners bolted to steel channels, called strongbacks. These are anchored to the Gulf floor. Filling or emptying of the tanks is accomplished through hoses running ashore.

Fire-breathing jetmobile

Like a dragon in reverse, this jet-powered car spits fire from its tail instead of its nostrils as it races in open fields in Hialeah, Fla. Bill Vandervalk, a salvage dealer, built it from Air Force scrap. He has never been bothered by tailgaters. The drum that looks like an engine hood in front holds diesel fuel. One test run can empty it.





EXTRA AIR swallowed by monster intake fans bypasses the main engines to give added thrust to new Stratoforts.

Bigger air bite for B-52

Oversize blades in the maws of its turbofan engines will gulp vast quantities of air to increase range and shorten takeoff for the B-52H bomber [PS, Sept. '59]. The new models will be delivered to the Strategic Air Command next year. Huge fan blades in front of the eight Pratt & Whitney jet engines act like propellers in a conventional plane to increase performance while lowering noise during the Stratofort's climb to altitude. The B-52H also will carry more punch: the Douglas Skybolt, a new airborne nuclear-headed ballistic missile.



TURBOFAN ENGINES on this B-52G test-bed will be standard on H models of intercontinental bomber now in production.



AERIAL LIFT has wooden bottom and a metal frame. It's equipped with zipper, hand supports, folding seat inside, and peep holes.

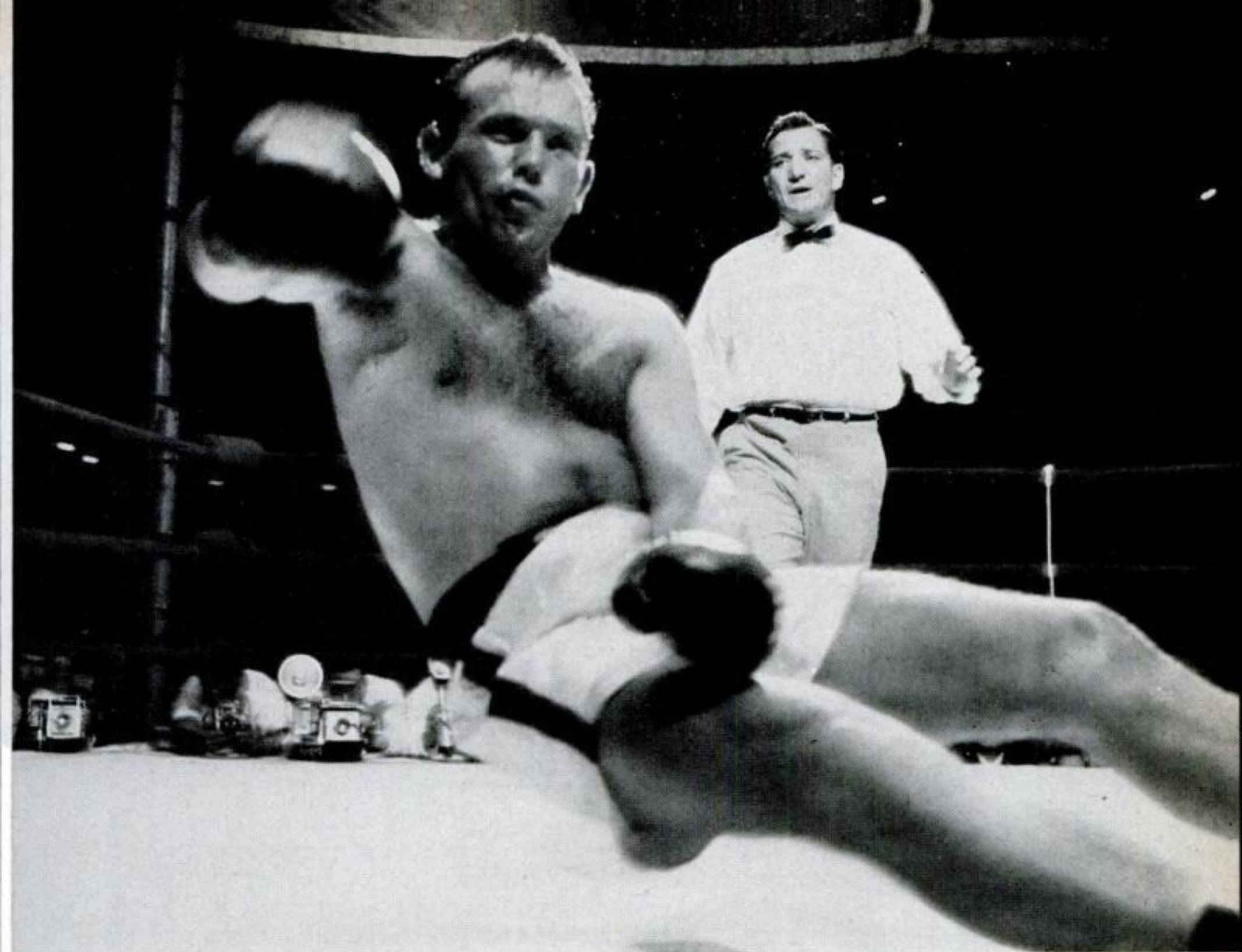


ROPE IS DROPPED FIRST. The man being rescued uses it to guide the device down. When he's inside, the bag is pulled up.

Rescue bag

A new aerial rescue device—an overgrown, man-carrying duffel bag—is being tested by the Army. Like the harness now in use, the canvas bag is lowered from an airborne helicopter; but getting in and out of it is easier.

Materials for its manufacture cost less than \$10. The bag folds flat for storage.



Knockout drop: Anesthetized by Floyd Patterson, Ingemar Johansson topples in June bout.

What Happens When You Black Out

It's not at all like going to sleep. And there are many causes—including some strange ones

By Lawrence Galton



Maybe you fall off a ladder—and the birdies sing.

A BOXER takes a solid right to the jaw and kisses the canvas, out cold—yet a minute or two later leaves the ring under his own steam.

Even without stepping into a ring, few of us escape losing consciousness at some time or other ourselves—or witnessing and having to deal with blackouts in others. We fall off ladders, tumble down steps, the kids drop out of trees, we or they get beamed with balls—and the birdies sing. Blackouts are frequent in auto crashes and other accidents which yearly injure 10 million. They also go with some diseases.

Because of this, scientists have been checking into them. Here, on the following pages, is what they've been learning about this common phenomenon.

CONTINUED

III

How does a blow produce a knockout?



When blood pressure falls sharply, oxygen doesn't get to the brain.

The classical kayo punch in boxing lands "on the button"—the point or side of the chin. The force is transmitted up and back to the base of the skull. In the process, a bundle of nerves in the neck—behind the angle of the jaw—suffers a heavy jolt.

These nerves control the blood pressure. With the blow, pressure falls precipitously. Without enough pressure behind it, blood can't push up against gravity to feed oxygen to the brain. The victim crumples.

It happens almost instantly. With some 10 billion sensitive nerve cells, the brain, of all organs in the body, needs the most oxygen. Even a fleeting lack of it will produce unconsciousness.

That's one way a knockout is scored. There's another. The scientific name for it is concussion.

What happens in a concussion?



If a crock of Jell-O hits a solid wall, the sudden stop compresses it.

The word stands for a violent shaking up of the brain inside the skull.

You get a clear picture of what happens, suggests Dr. C. B. Fausset of Indianapolis, if you think of a large earthenware crock full of Jell-O. The crock is the skull—and the Jell-O, with about the same consistency as brain matter—can be the brain.

If you slide the crock along the counter, starting it gradually and letting it stop on its own, Jell-O and crock are always in contact with each other. But let the crock suddenly strike a solid wall and the abrupt stop will compress the forward part of the Jell-O and, at the same time, pull the after part away from the crock. The Jell-O has suffered a concussion.

In the brain, one particular area—the reticular formation—has the job of arousing you from sleep and keeping you conscious and alert. When it's deranged by concussion, you black out.

How common are concussion blackouts?



Any wallop can do it.

Very. Almost any solid blow on the head—it can be a wallop with the proverbial rolling pin, a fall from a ladder, or even a stumble, trip, and bang—can do the job.

In auto crashes, 75 percent of all persons hurt suffer head injuries, according to a Cornell study. Some escape with minor bruises but often the quick deceleration pitches the brain forward inside the skull, producing concussion and blackout.

Among sports, football ranks next to boxing as a source of concussion—with tacklers, according to one recent study, running the greatest risk, followed by ball carriers, then linemen.

In many other sports, head-against-head and foot-against-head contacts produce concussions. And a ball—it needn't be a hard one—can do the trick. In soccer, where players use their heads as bats, the ball takes off like a cannon shot after a hard kick. The leather-covered inflated blad-

der, in the early part of its flight, can be as effective in producing a blackout as a bean ball in baseball.

How does a blackout differ from sleep?



It doesn't take much to wake you from a snooze—but a blackout is different.

On the surface, one may seem like the other—but there's a big difference.

In sleep—which is a halfway state between consciousness and unconsciousness—many transactions between your brain and the environment dwindle away; just closing your eyes cuts off a great number of incoming impulses. But your sense organs still remain alert enough to respond to danger signals. It doesn't take much—often just a whisper will do—to wake you from a snooze. That's not true for unconsciousness. When you black out, you're literally out—out of reach of ordinary stimuli.

Do the birdies sing?

Just before blacking out, you think you perceive a variety of sensations that medical men call "auras." You may hear birds—or other things that aren't there. And you may see stars or other visual hallucinations. Although it's relatively rare, some people even smell things that aren't there.

Do memory losses occur?



Football players often forget all details of how they blacked out.

Often. After a knockout, some fighters can't recall what happened just before the blow; others can't recall anything at all about the whole bout. In his first fight with Ingemar Johansson, Floyd Patterson says he couldn't remember going out. In fact, when he heard the referee say "neutral corner," he thought he'd knocked Johansson out.

"Then I got up and started to talk," Patterson recalls, "and I had this pain in the back of my head and I'd have laid odds that it was the referee who had clouted me there from behind."

Football players have been known to forget all details of the play that made them black out—even what happened in the dressing room after recovering consciousness.

Depending upon the severity of the brain injury, memory may be lost for long periods. Dr. Walter Alvarez of the Mayo Clinic tells of a 48-year-old man who, while horseback riding, was hit by a car, stayed unconscious for 18 hours, then seemed to improve. After a week, however, he still had no idea of where he was or what year it was. For three weeks his memory was impaired. Even after his recovery he could not recall the 10 days before the accident or his days in the hospital.

What are the other aftereffects?

Sometimes none at all. You may knock yourself out in a fall and get up a few seconds later none the worse for it. Many athletes, after being out cold, jump up and beg to keep playing—and some are allowed to and do a good job. On the other hand, there's nothing unusual about the case of a college halfback who struck his head on the ground

while making a tackle and was out for just a few seconds. Yet, for three days afterward, he felt drowsy, fatigued, unable to concentrate. After a week of rest, he recovered and completed the season in good shape.

Are some people especially vulnerable to blackout blows?



One man passed out every time he backed out of his garage.

According to Dr. Soma Weiss of Harvard, there are people who have a more sensitive center of consciousness in the brain. It takes much less of a concussive jolt to affect it.

There also are individuals with an especially sensitive nerve bundle in the neck. In experiments, investigators have been able to make such people pass out just by stroking the neck area a few times. One man who blacked out every time he backed his car out of his garage turned out to have a nerve bundle so oversensitive that just turning his head at an acute angle excited it and dropped his blood pressure, making him lose consciousness.

How come an injury far from the head sometimes causes a blackout?



That momentary weakness after you banged your finger with a hammer was a touch of shock.

Shock is the reason. As doctors use the term, shock has nothing to do with emotional or electric shock. If you've ever felt a momentary weakness and faintness after, say, banging a finger with a hammer, you've had a touch of shock. It may follow even a minor injury, and it doesn't always produce unconsciousness. If severe, however, it can even cause death.

In shock, the brain doesn't get enough blood because the volume of circulating blood falls. That can happen three ways. You may lose blood by hemorrhaging—internally or externally—after an injury. The average 150-pound person has 10 pints of blood. Loss of just one pint sometimes can induce shock; loss of three pints almost invariably does.

You can also go into shock if you lose a lot of water through excess sweating, large-scale vomiting, or diarrhea. This pulls fluid out of the blood and cuts down the blood volume.

The third way is through pain. Pain can set up nervous reflexes that expand blood vessels. When fully expanded, vessels in your muscles alone can hold three pints of blood—and those in the abdomen can hold all the blood in the body. That leaves little or none for the brain.

To combat shock, the head is lowered to help get blood to the brain, blood transfusions may be used, or large amounts of fruit juices may be given if there has been dehydration.

How do emotions trigger blackouts?

Emotional blackouts commonly occur when there is some danger, real or fancied, and no escape or action is possible—

[Continued on page 226]

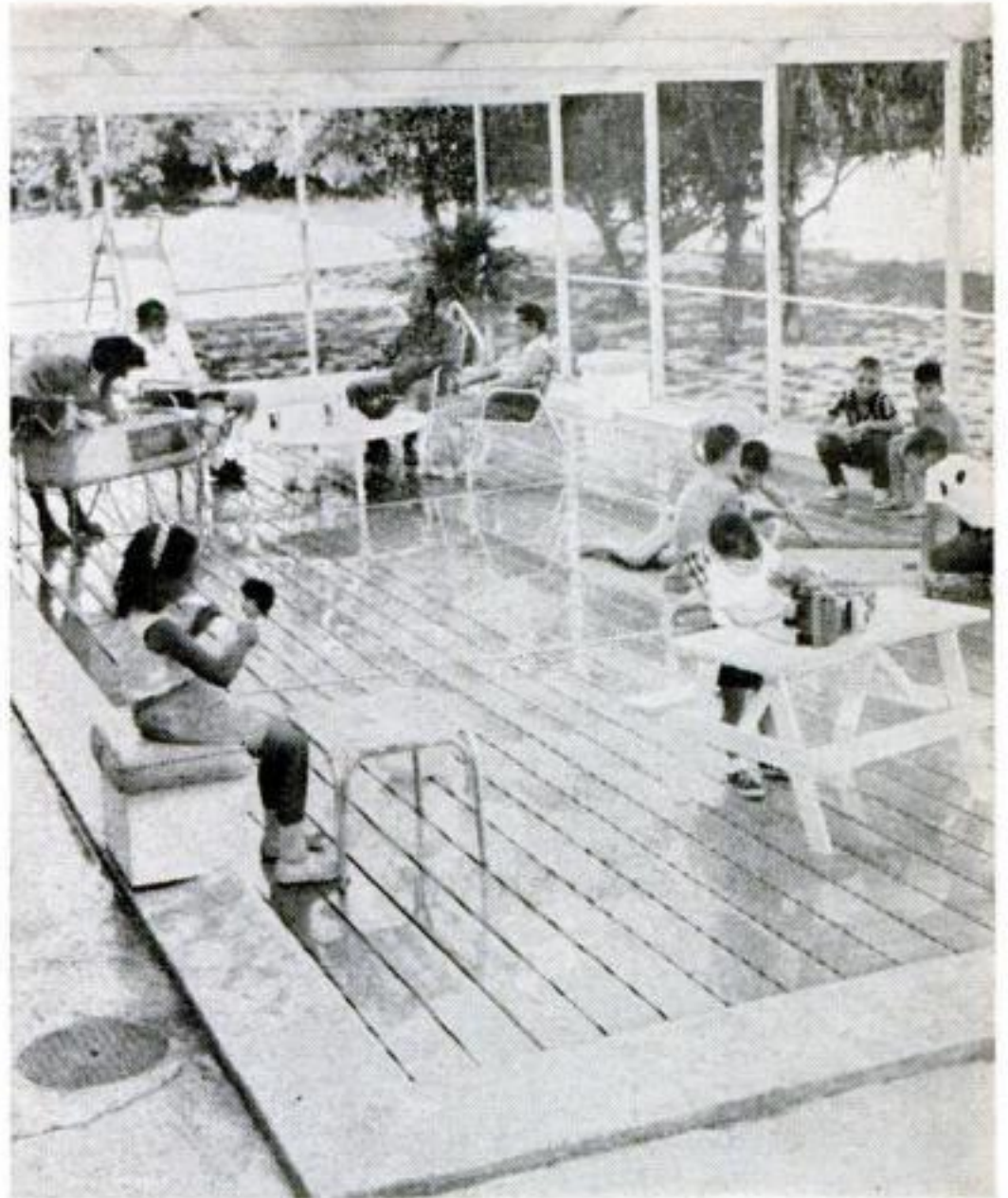


NO NEED for mom to call her kids in from a dip. She just presses a button and the elevator platform lifts them clear out of the water.

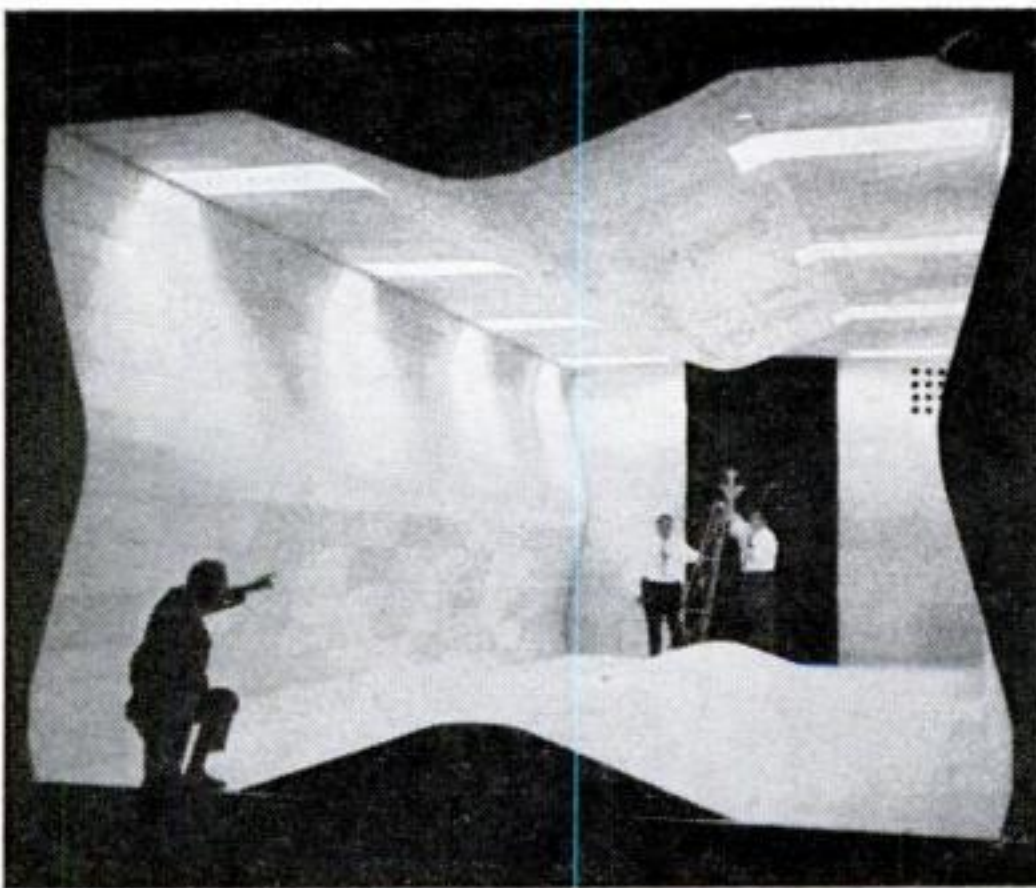
Elevator covers swimming pool

The bottom of this swimming pool is also its lid. The platform is made of spaced nonskid-aluminum boards. It can be raised or lowered electrically by pushbutton control and locked at swimming or wading depth, or on top of the water.

The platform was designed by Safety Pool Lift, Inc., Hialeah, Fla., and the model shown here—for a 15-by-30-foot rectangular pool—sells for \$1,500.

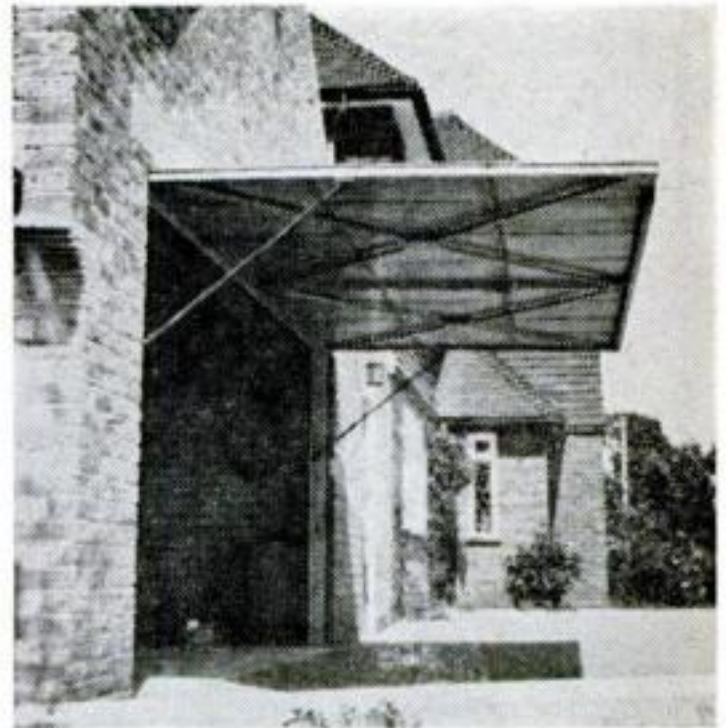


ELEVATOR LID LOCKS on top of the pool to become a dry patio for entertaining guests after a swim. It also keeps neighborhood children and pets from falling in.



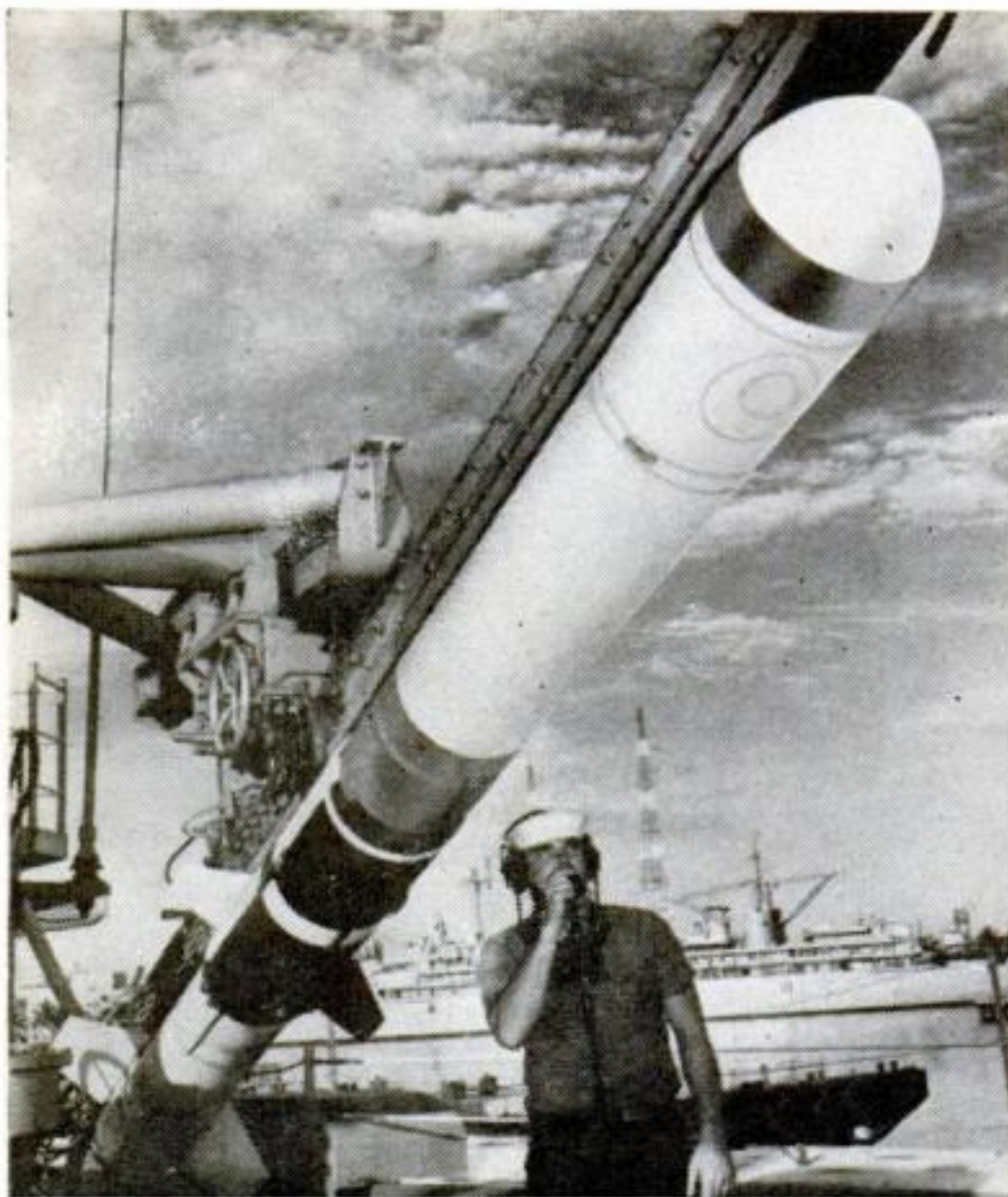
Room without echoes

Antennas for advanced aircraft and spaceships are tested in this 40-foot chamber specially designed for beaming radio signals at models. The enclosure, built by Republic Aviation, eliminates external interference. The Coke-bottle shape of floor, walls, and ceiling absorbs radio waves and makes the room almost completely echo-free.



Dual-purpose garage door

The top-hinged garage door above swings up to provide a covered work area or a port for a guest's car. It's a British design, made of steel panels, and is supported by hinged struts guided in vertical channels. Counterbalancing is done through cables attached to a single weight along one of the walls.



Newest antisub rocket

Here's a close look at the ASROC (antisubmarine rocket), the Navy's latest and deadliest answer to the submarine threat. Poised and ready for loading, the missile is undergoing tests aboard the U.S.S. Norfolk. Its solid-propellant rocket carries a homing torpedo thousands of yards to the target area. There, rocket and air frame fall away, a parachute lowers the torpedo into the water, and a homing device locks on the target. Minneapolis-Honeywell developed the missile.



What's missing here?

No, this car didn't lose its front right wheel in a freak accident. It was taken off deliberately by Chrysler engineers in a stability test of this year's new unit-body construction.

To counterbalance lack of support up front, the engineers loaded the trunk of the car with a ton of weight and then drove from Chicago to Detroit in 9½ hours, using turnpikes and averaging 45 m.p.h. for most of the trip.



BLINDFOLDED AND TRANQUILIZED, a race horse is securely strapped to the upright table top.



TABLE IS TILTED to a horizontal position. Mounted on a truck, it permits surgery right at the track.



OPERATION IS PERFORMED successfully on horse's leg. Dr. R. J. Keeran, the surgeon, is also the inventor.

Operating table keeps horses in races

Many injured race horses that ordinarily might have to be destroyed may now be saved with a tilting hydraulic operating table. The truck-mounted unit is in use at Detroit's Hazel Park and tracks of the Michigan Racing Association. The horse above is having a bone splinter removed.

New Ideas from the Inventors

.....

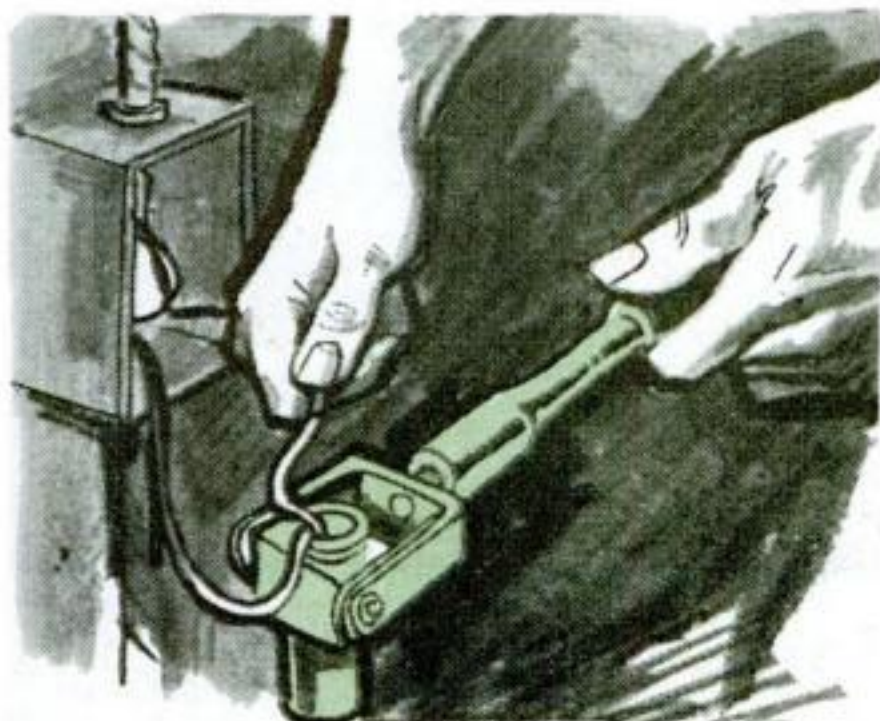


Vacuum Collects Fallen Leaves. Parked cars that prevent sweeping of leaf-cluttered gutters wouldn't keep this mobile vacuum cleaner from doing its job. The

recently patented motor and blower assembly could be mounted on a standard dump truck. It would feed collected leaves into the truck's storage chamber.

Solder Pot Heated by Iron. You could make quick and secure electrical joints by dipping wire ends into this soldering pot. To use it, you'd unscrew the regular soldering tip from your iron and insert the shaft of this heat-conducting frame into the iron's socket.

Magnetic Goggles Catch Chips. The magnetized sidepieces of these safety goggles might give you extra protection against flying chips of iron or steel. Particles whirled toward your face by a grinding wheel, say, would be drawn to the magnet and held there for safety.



More Inventors' Ideas



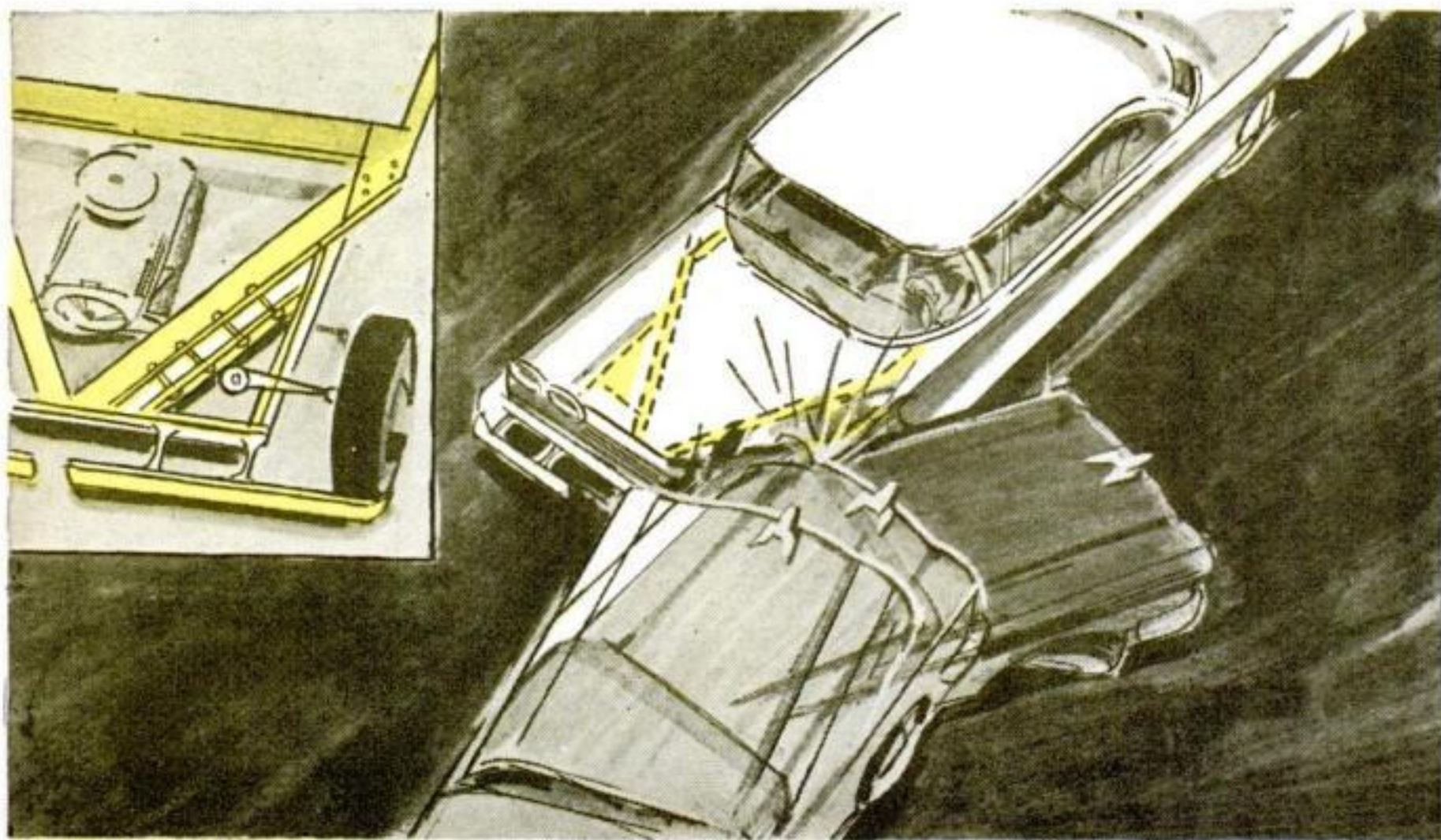
Skate Heel Stops Flops. Learners—and experienced skaters—could avoid painful back-spills on skates equipped with this brake. If a skate started to run out from under you, the base of the brake would hit the ground to slow the runaway wheels and restore your balance.



Blind Comes Apart for Cleaning. Pulling the spring clips off the ends would free these Venetian-blind slats from the rigging cords. They could be drawn out of the laddered tapes for easier cleaning. The come-apart construction would also ease cleaning or replacement of the tapes.

V Frame Cuts Crash Damage. You'd have a better chance of escaping collision injury in a car with this safety frame. Separate bumper and axle assemblies

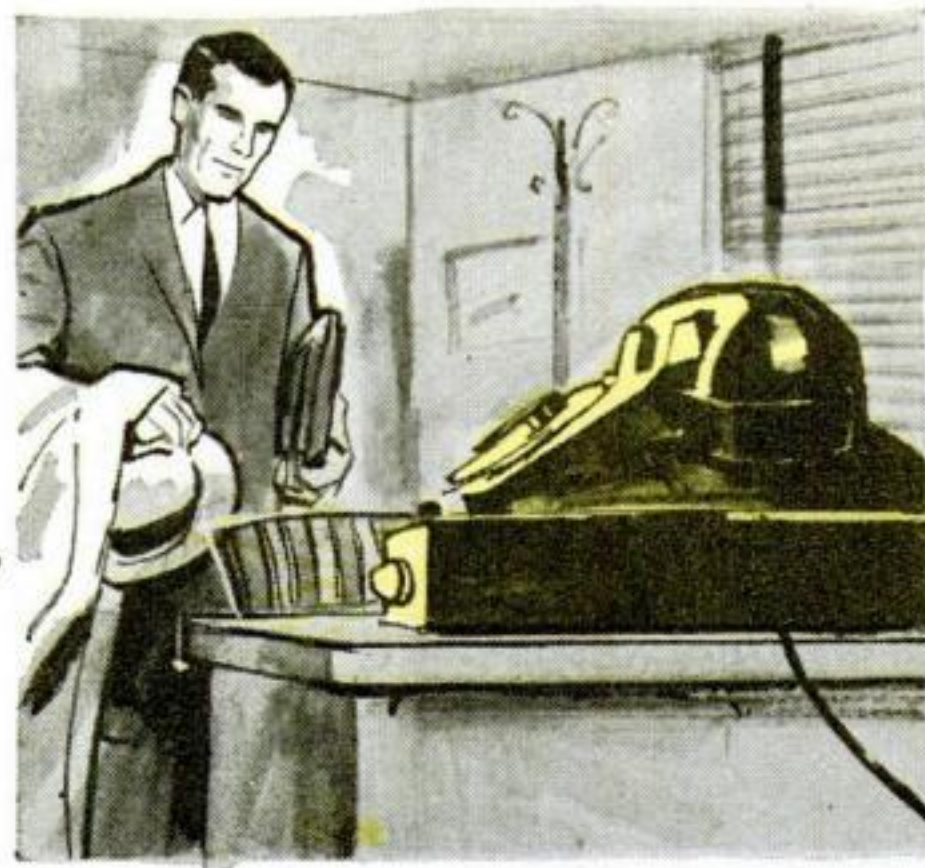
would be fastened by shear bolts. When severed by a crash, the nearer assembly would slide back at an angle to deflect the impact and reduce its force.





Heater Attachment Warms Bottle. With this bottle-holding cylinder mounted in front of the fan casing of your car heater, you could warm a baby's bottle during a trip without taxing the electrical system. The slide-on attachment could be quickly removed when not needed in the car.

Signal Shows Phone Has Rung. You wouldn't have to guess whether you had received an expected call while you were out if your phone rested on this base. A vibration-sensitive switch would turn on the indicator light; a reset button would turn it off. If you used a phone-answering service, you'd know at a glance whether or not to check your calls.



Canoe Seat Attaches Oarlocks. You could paddle your canoe, or row it when you wanted to make better time, by slipping this removable seat on or off. Held in place by the rower's weight, the seat braces would stiffen the canoe's sides and also pivot the oars for rowing.

The following patents have been issued on these inventions:
Leaf cleaner—No. 2,803,847 to C. P. Hobbs, N. Sacramento, Calif.; **Solder pot**—No. 2,806,121 to S. H. Sacker, New Orleans; **Goggles**—No. 2,920,327 to M. Singer, Portland, Ore.; **Skate brake**—No. 2,872,201 to B. T. Wagers, Winston, Ky.; **Blind**—No. 2,868,284 to H. F. Mason, Bellaire, and A. E. Long, Shadyside, Ohio; **V frame**—No. 2,896,735 to F. W. Bohn, Scranton, Pa.; **Bottle warmer**—No. 2,811,963 to J. R. Williams, Petersburg, Ind.; **Phone signal**—No. 2,813,154 to J. Rabinow, Takoma Park, Md.; **Oarlocks**—No. 2,815,517 to J. H. Andresen Jr., Greenwood Lake, N. Y.

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D.C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.

Personal Two-Way Radio Needs No License



"I read you loud and clear." To talk, press button; to listen, release it. Speaker at top doubles

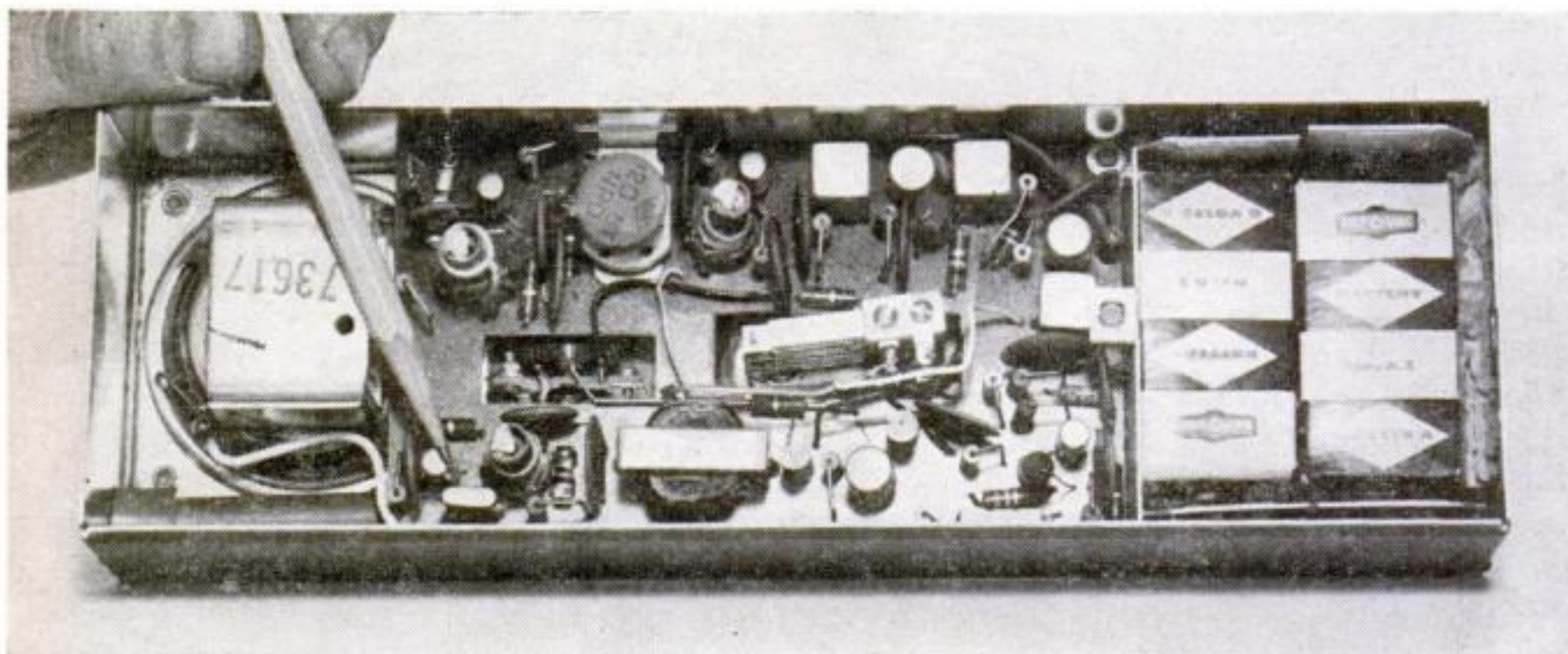
COULD you use a personal intercom that tucks in your coat pocket and would let you talk to someone a mile away just by pushing a button?

If you read Dick Tracy, this may sound like old stuff. But until recently, if you went out to buy a gadget that would duplicate the feats of the comic-strip wrist radio, you'd wind up with a hefty double handful of electronic gear costing more than a good TV set—and you'd have to get a license before you could use it. The weight of the batteries alone would be enough to discourage

you from making it a part of your everyday wardrobe.

By the time you read this, if manufacturers' plans stay on schedule, practical personal two-way radio communication will have achieved a new degree of freedom. The instruments weigh less than the average camera and probably will sell for around \$100. You'll need no license of any kind. They're simpler to use than a dial phone.

An obscure paragraph (heretofore unexploited) in Part 15 of the regulations of the Federal Communications Commis-



TINY QUARTZ CRYSTAL (at pencil point) holds transmitter on frequency. Two six-volt batteries

(right) power the transceiver, made by Radio Mfg. Engineers, Washington, Ill.



as mike. Volume control is above button.

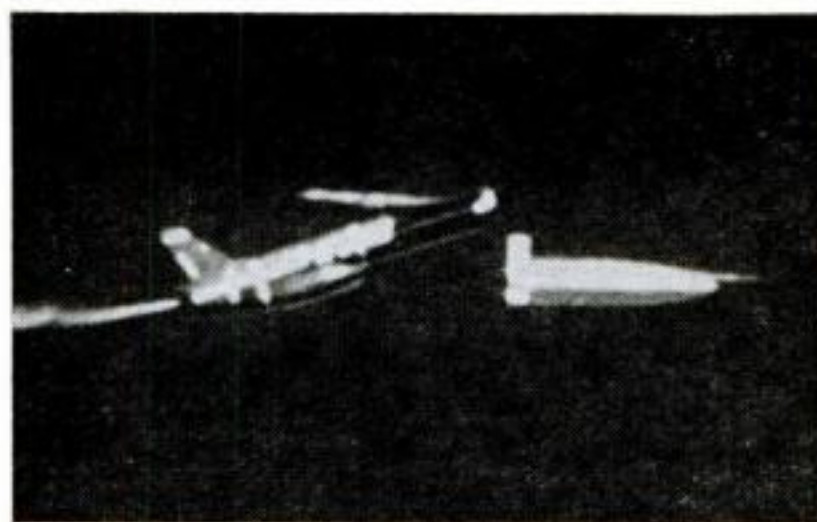
sion makes them legal; new transistor circuitry makes them technically feasible.

The pertinent rule says that no license is required for a "low-power communication device" if the transmitter adjustments are sealed by the manufacturer and certified to comply with the operating conditions specified by the Commission.

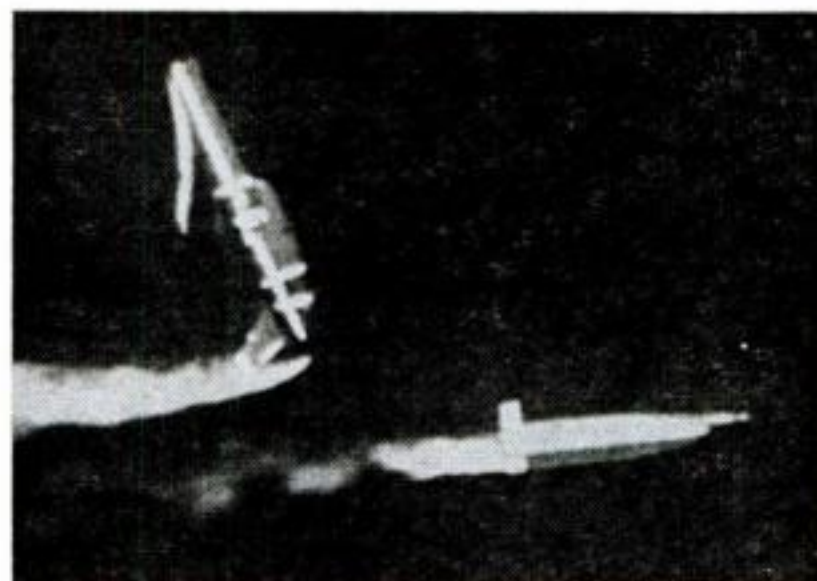
These flea-power transceivers use the same frequency channels as Citizens Band service. In fact, you can get a Citizens Band license for them (if you are over 18) that will permit you to answer and talk to regular licensed CB stations; without a license you can only listen to them. With or without a license, of course, you may talk to anyone using similar equipment to yours.

The main difference between Part 15 and standard Citizens Band equipment is the size and power requirements of the transmitter. Regular CB transmitters are invariably built to deliver full legal power allowed under their license. This means using vacuum tubes—transistors don't have the muscle. Consequently, almost all standard CB transceivers are built to operate on 115 volts AC. You can have them in your car or boat by using an inverter—but you can't carry them in your pocket.—*Robert Hertzberg.*

Nose cone breaks off, heads for target



1. ICBM SNARK, on signal from guidance system, releases nose cone with dummy warhead while still miles away from its target.



2. WARHEAD STREAKS OFF on ballistic trajectory, leaving the guided airframe to fall to earth and cause confusion to enemy radar.



3. SUPERSONIC SPEED is attained by dummy nuclear nose. Snark has demonstrated accuracy on targets over 5,000 miles away.

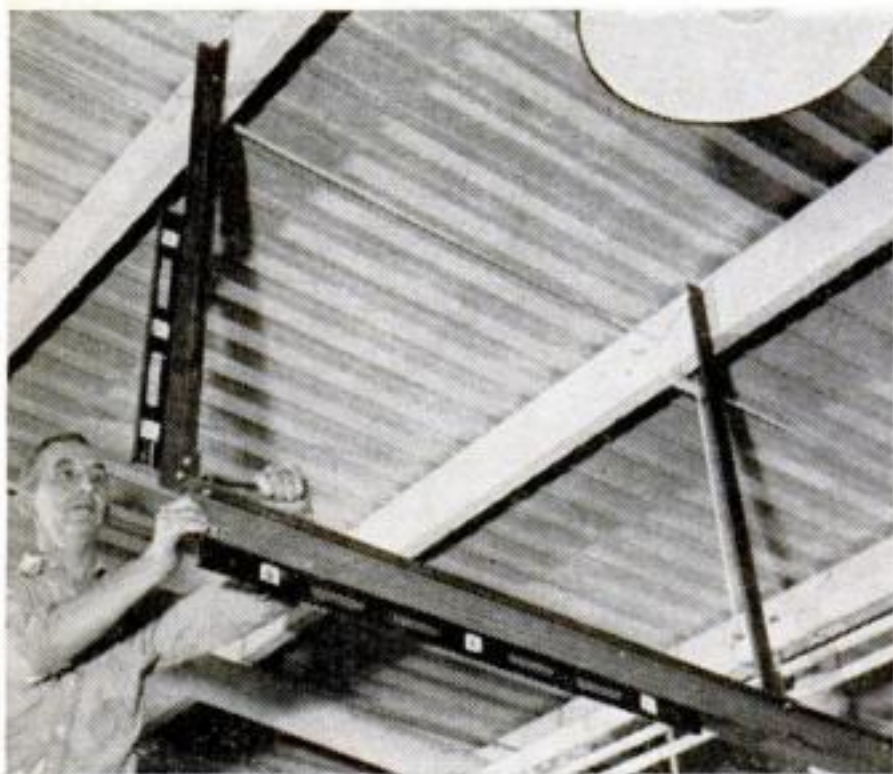
First photos of separation of a nose cone from the Air Force's Snark show how its warhead is detached from the Northrop intercontinental ballistic missile and sent on to its target. The missile is guided to this point, releases its warhead on signal, and sends it on a ballistic trajectory. The Snark, operational at Presque Isle Air Force Base, Maine, showed pinpoint accuracy in long-range test launchings.



Do-It-Yourself Aluminum House

With a single helper, you can put up this prefabricated five-room house in just five days. It's built of interchangeable panels, faced on both sides with baked-on color-finished aluminum, insulated with a 1½-inch cushion of styrofoam,

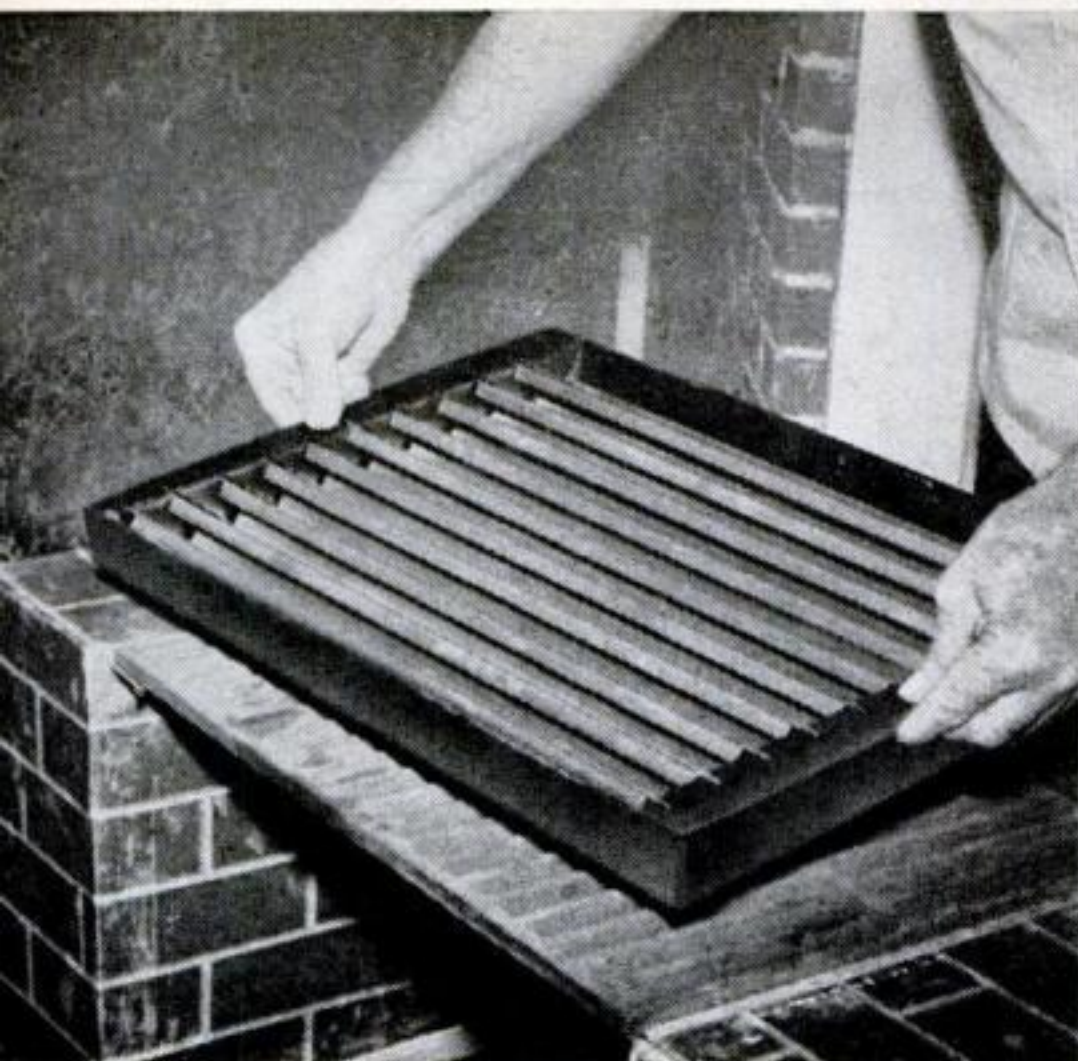
and locked together like a toy construction set. The model above costs \$5,500 without the lot. Other, smaller ones are \$3,500 and \$4,700. All have fully screened porches. Florida Industries, 4503 W. Alva Ave., Tampa, Fla.



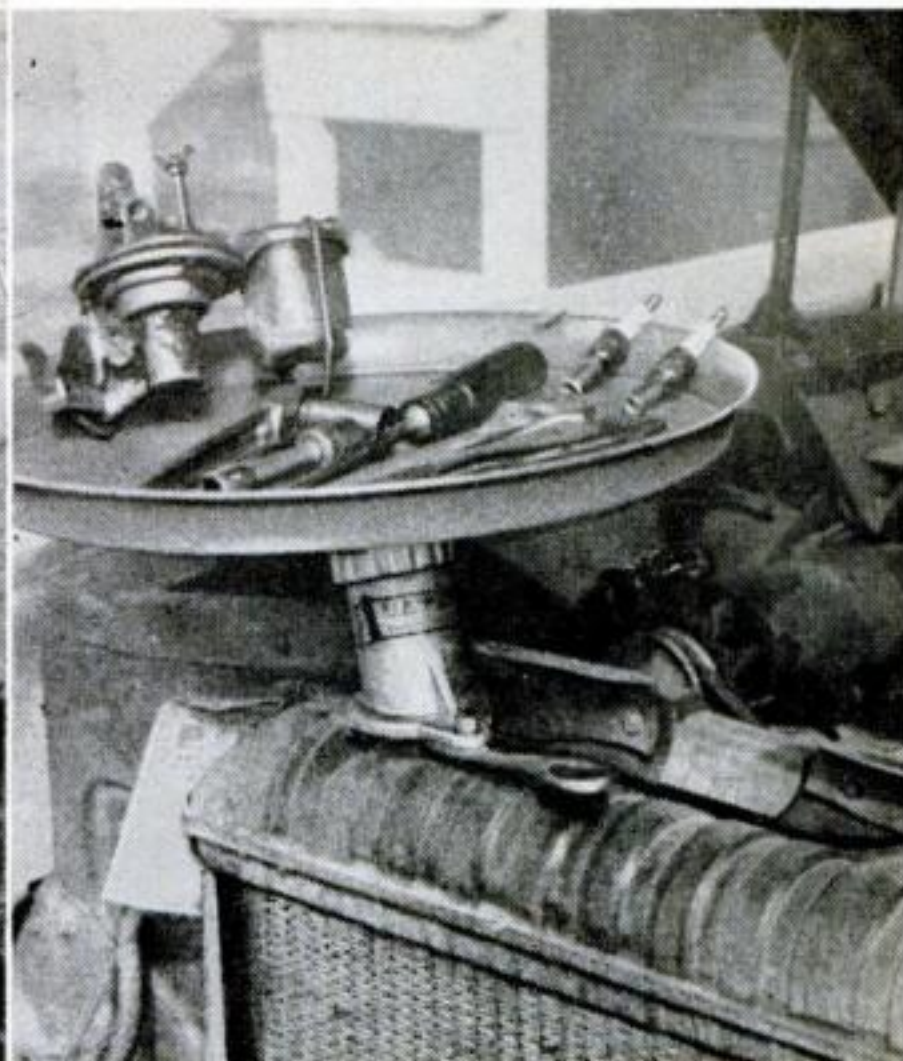
NO-HANDS LEVELS are edged with a magnetized vinyl-plastic strip of the kind used to close refrigerator and screen doors. They cling to upright and horizontal steel members, leaving hands free. In 12-, 18-, 24-, and 48-inch lengths, \$5, \$6, \$7, and \$12.50. Empire Level Mfg. Co., Milwaukee, Wis.



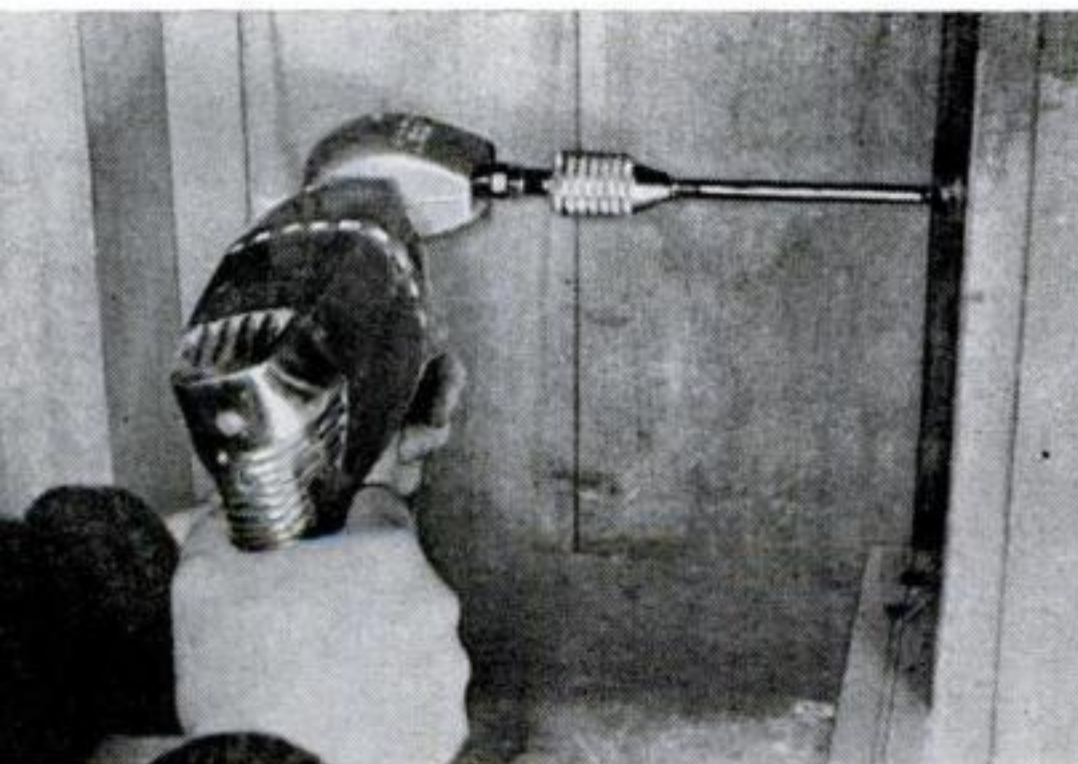
STATION-WAGON BUNK fits on the front seat and windows of any domestic station wagon to provide upper-level sleeping for two, leaving room on the floor for two more. Roll-up canvas on a 50-by-75-inch tubular-steel frame covers a center dividing bar. \$37.50. Griffith Tool Co., Villa Park, Ill.



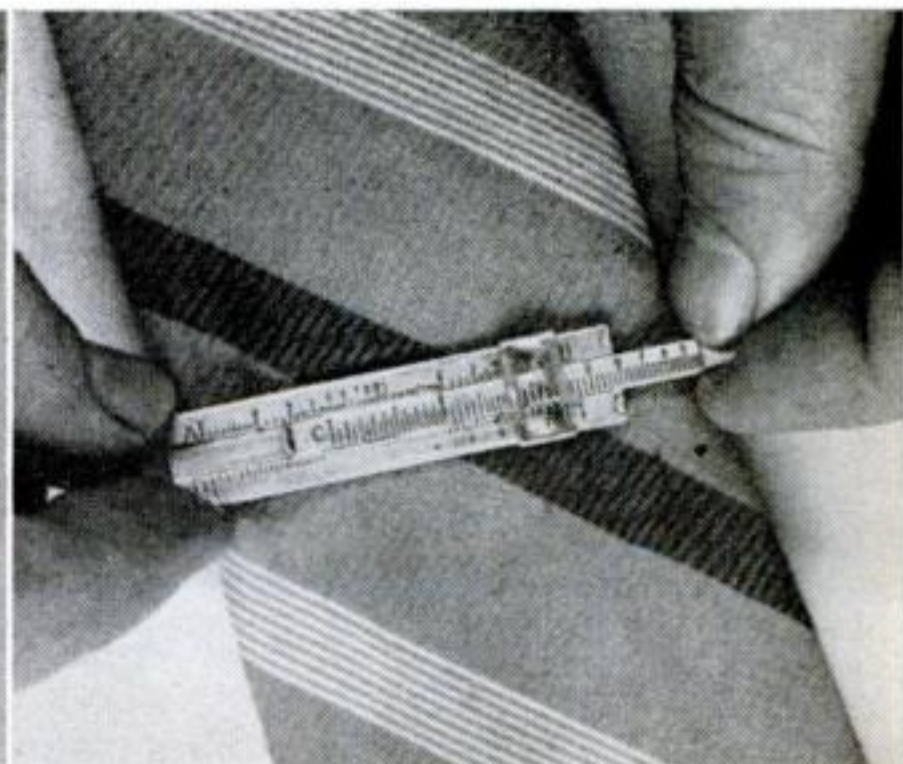
BARBECUE GRILL consists of a series of V-shaped louvers in a 14-by-22-inch steel frame. They channel drippings to the sides instead of into the fire, preventing flare-up, smoke, and burning. Price, \$8.95; stainless, \$16.95. Cast-iron grate, \$4.70 extra. M & B Sales Co., 2615 Love Field Dr., Dallas, Tex.



TOOL TRAY fastens on intake spout of a car radiator to keep parts and tools handy on tune-up and repair jobs. The tray can be leveled on any car and is detachable from the stem so a second tray can be substituted. It costs \$12.95; extra trays \$5.95 each. B & M Mfg. Co., Box 746, Winston, Ore.



RIGHT-ANGLE DRIVE for $\frac{1}{4}$ -inch power drills is reversible, doubles speed for finish sanding, or reduces it by half for drilling large holes or buffing. It fits directly on a male or female spindle, uses drill's own chuck for bits or attachments. Price, \$4.95. The Stanley Works, 111 Elm St., New Britain, Conn.



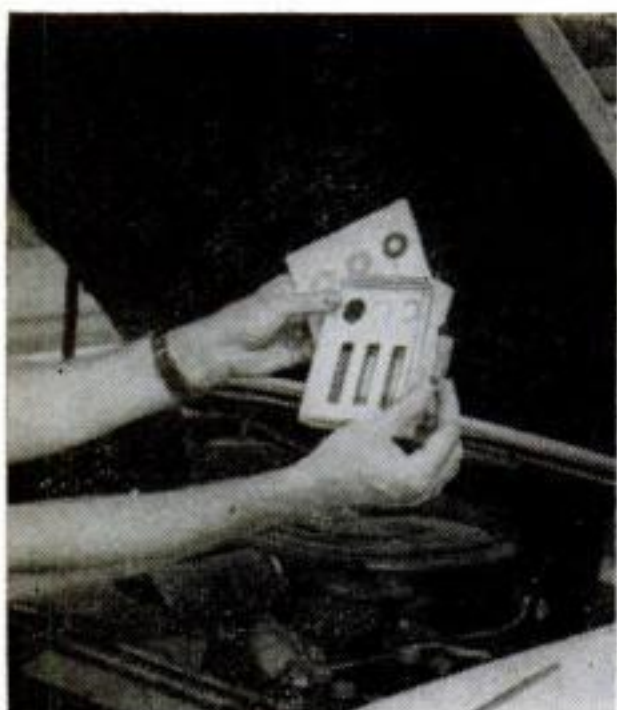
SLIDE-RULE TIE CLIP is a practical as well as novel accessory. It is calibrated accurately, and the slide is movable to work out answers to mathematical problems. A magnifying indicator makes results easy to read. Gold-plated, \$1.50; sterling, \$3.95, plus tax. Mother Hubbard, 10 Melcher St., Boston.



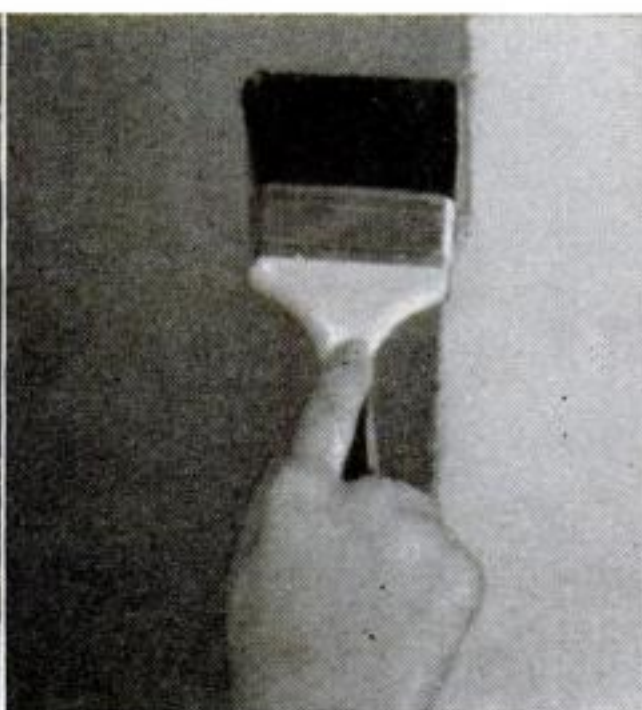
Dual-Temperature Heating Tray

A hot spot blended into the radiant glass panel of this new tray stays 40 degrees hotter than the setting for the rest of the panel. An adjustable thermostat

regulates the server from room temperature to 265 degrees, and a pilot light glows while the tray is turned on. \$39.95. Salton Mfg. Co., 519 E. 72 St., NYC.



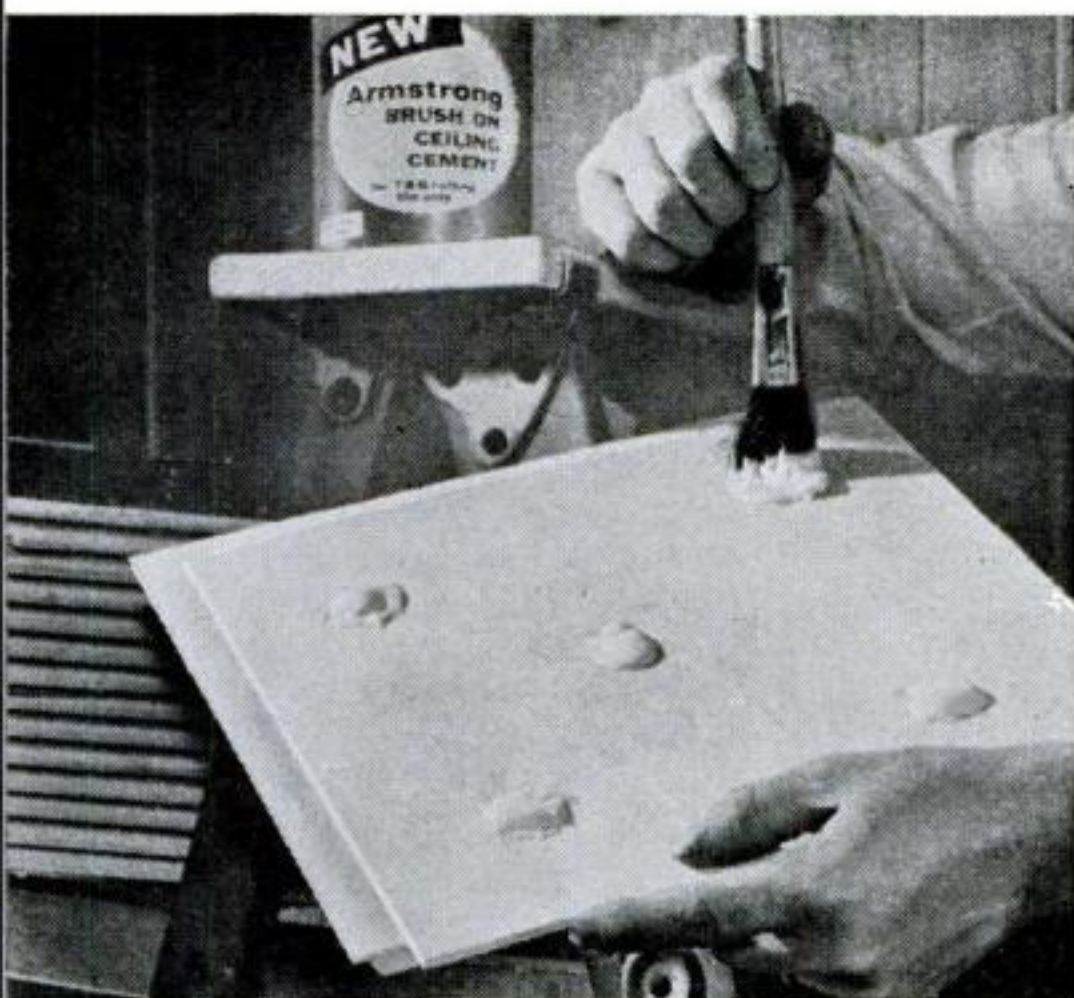
LUBE TESTER tells the condition of oil in your engine. It uses two tests: a fluid in which three drops from a dip stick are shaken to show acids, and a paper on which a drop shows solids or water. Kit for three tests, \$1. Gordon Laboratories, Annapolis, Md.



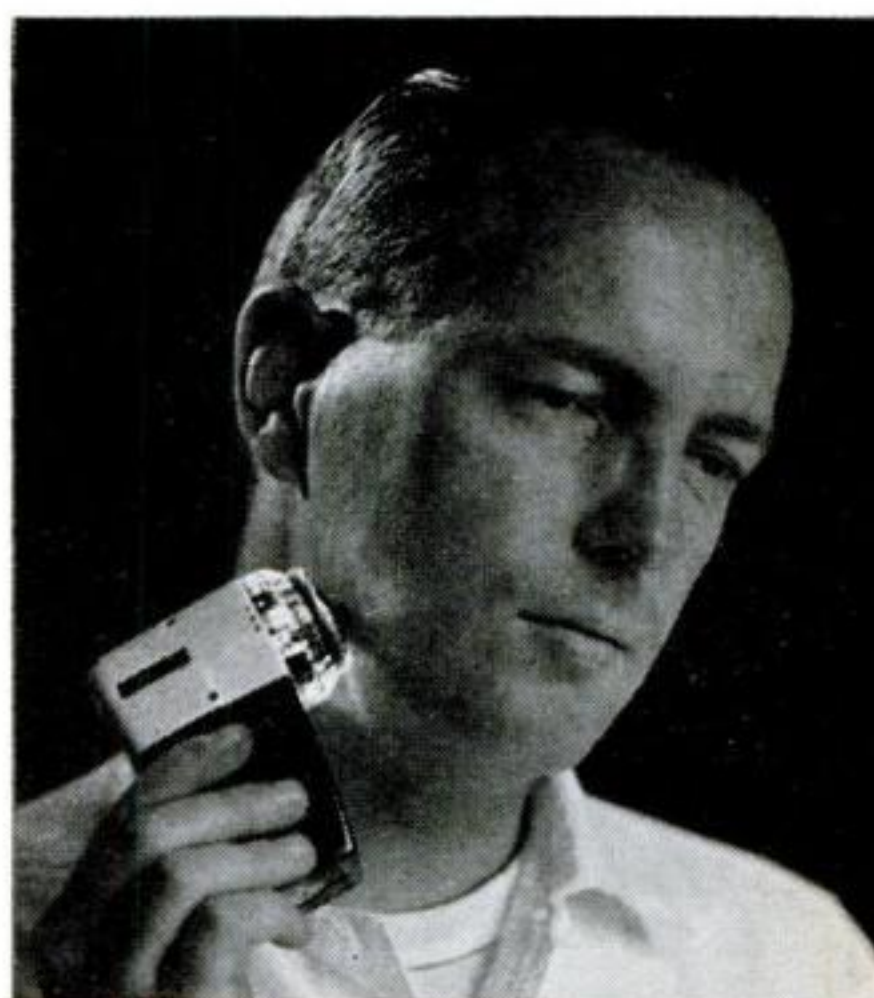
CANNED CEDAR lets you make a cedar closet of any closet in the house. It is pulverized aromatic cedar wood. Mixed with water, it sprays or brushes on like paint. Four-pound can (covers 60 square feet), \$6.95. Cook Enterprises, 54 Holland St., Asheville, N. C.



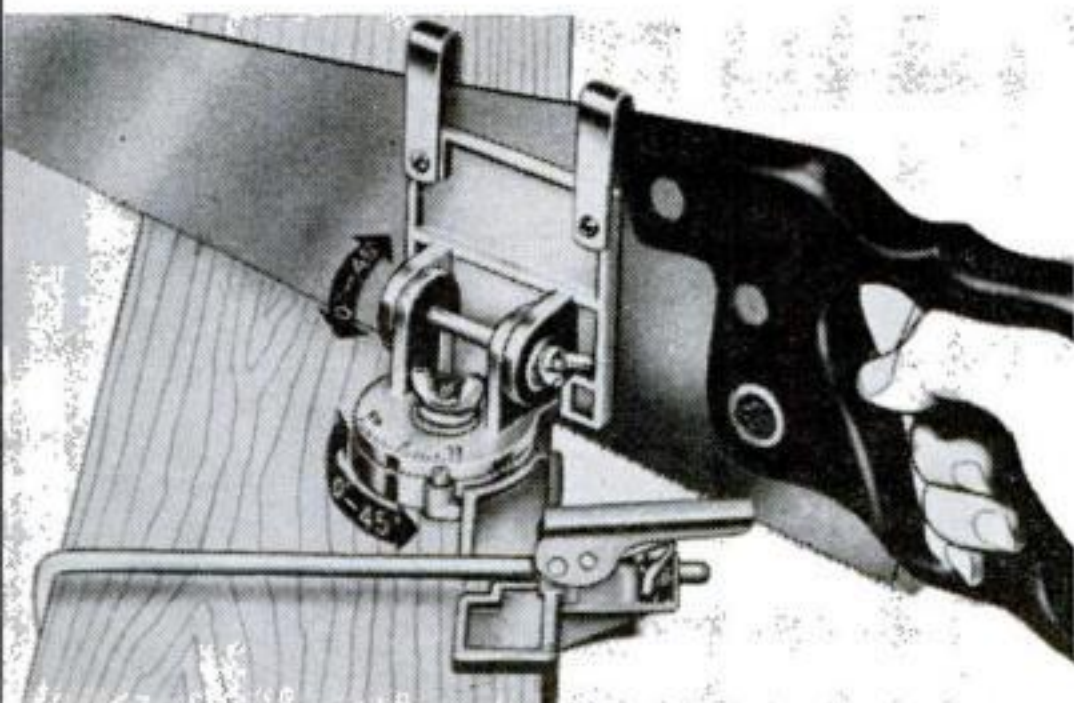
VINYL SURFACE on gypsum board provides stainproof, washable decorative finish. It's handled like other gypsum; nails or cements to studs or existing walls. Sheets are four feet wide, come in five textured colors. National Gypsum Co., Buffalo, N. Y.



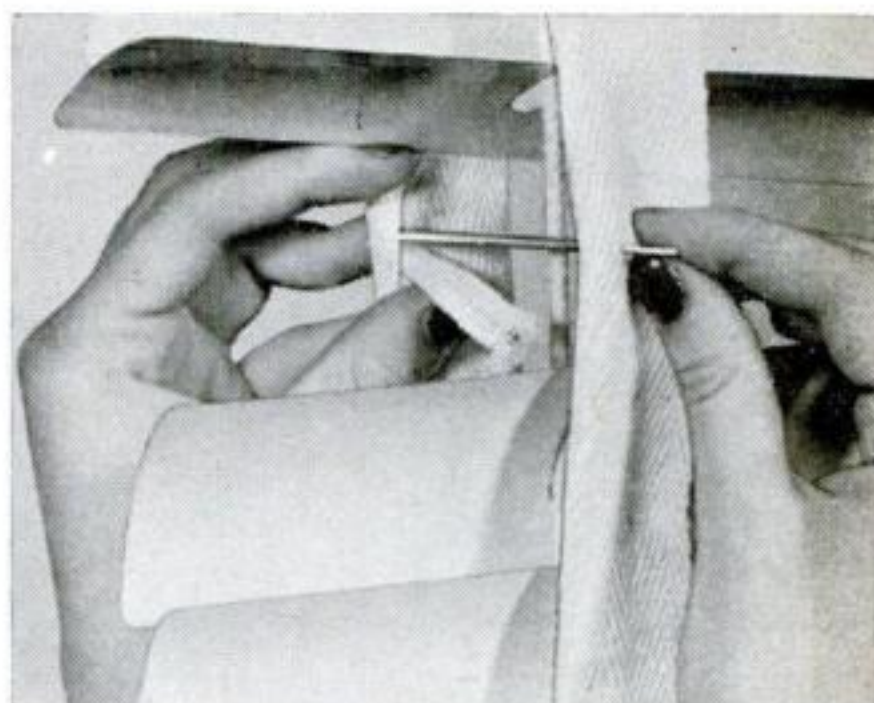
BRUSH-ON MASTIC is dabbed on ceiling tile and requires no spreading with a toothed applicator. You then staple the tile to hold it until the cement sets. There's no need to remove old paint and wallpaper unless badly peeled. Per gallon, \$6.95; per quart, \$2.75. Armstrong Cork Co., Lancaster, Pa.



LIGHTED SHAVER has two flashlight bulbs near its rotary head to give you shaving light in a dim or dark room. A pull-apart base contains a nickel cadmium battery good for up to 10 shaves. It plugs directly into outlet to recharge. German-made AccuMen costs \$25. Monroe Hattenbach, 347 Fifth Ave., NYC.



MITER GAUGE can be used with any saw having a blade up to 4 $\frac{1}{4}$ inches deep. It consists of three metal parts: clamping base you can attach to stock up to 1 $\frac{1}{2}$ -by-8 inches, swivel base notched in 5-degree calibrations from zero to 45 degrees, and backing guide and plate for holding saw on angle pivots with wing-nut adjustment. \$6.95. Nielsen Saw & Mfg. Co., 2395 W. 7th St., Eugene, Ore.



VENETIAN-BLIND KIT contains plastic supports that replace torn cloth ladders that allow slats to droop. You cut out the old support, insert a plastic one, and fasten it by pushing a staple through the cotton or plastic tape into two holes in each end of the ladder. A kit with 12 ladders and a supply of fasteners sells for 39 cents. Slat-Fix Co., 72 Spruce St., Hicksville, N. Y.



BAGGAGE CONTAINER is pushed gently down a Jeep-mounted conveyor nosed into the cargo hatch of an incoming jet airliner.



FLOTATION is provided by low-pressure air supplied by a compressor installed on the Jeep and driven by its power take-off.

Baggage floats off jet

Luggage going on or off TWA's trans-continental DC-8 jets now floats through

the air like seeds in a milkweed pod. The system, developed jointly by TWA and Douglas, unloads incoming planes and delivers baggage to the claims desk



Wing-tip fuel tanks are supported by wings of their own . . .



. . . that are hinged to lessen strain on landing.

Wing tanks ride on own wings

Extra fuel tanks on the wing tips of this Beechcraft Twin Bonanza are supported by their own wings, so as not to add strain to the plane's wings. The extension wings are hinged to let the tanks touch ground on individual retractable wheels when landing. The Army is testing the device in the hope of lengthening the range of small aircraft.

Ingenious way to move an oil-storage tank

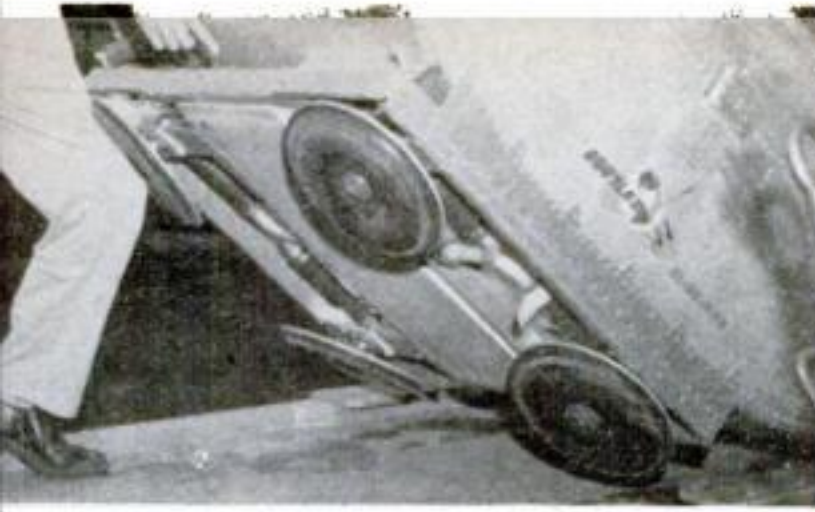
When a 55,000-gallon oil tank had to be moved 850 feet, engineers built a lake on which to float it to its new location at Riviera, Fla. First they threw up a dike



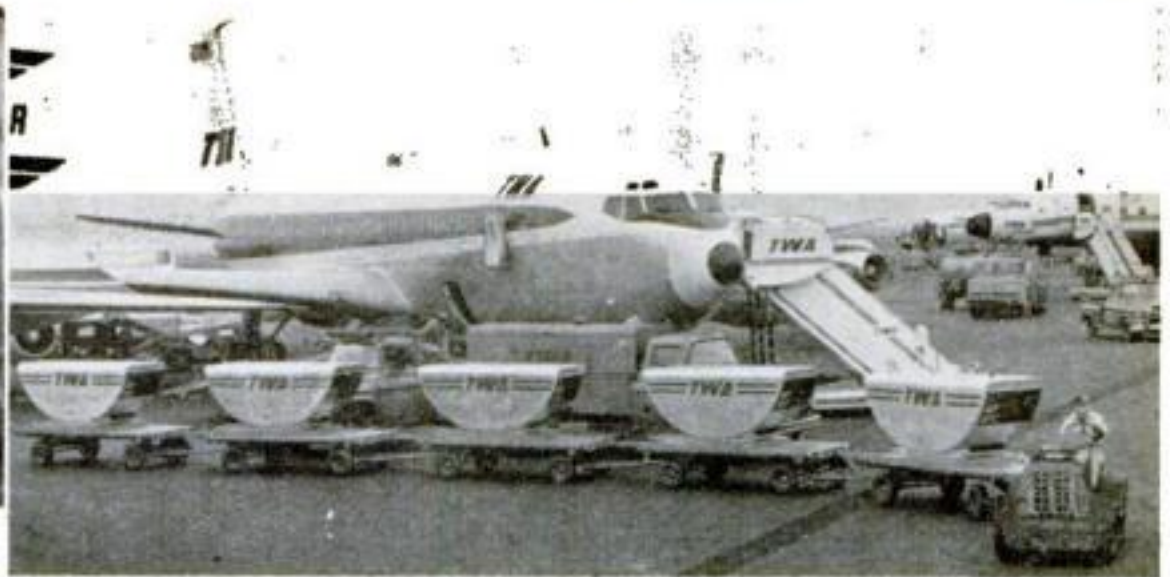
1. The floating operation begins for the big tank.



2. Crucial moment in moving



FOUR GLIDE-AIRE PADS on the underside blow air cushions from center nozzles. By eliminating friction, they make moving easy.



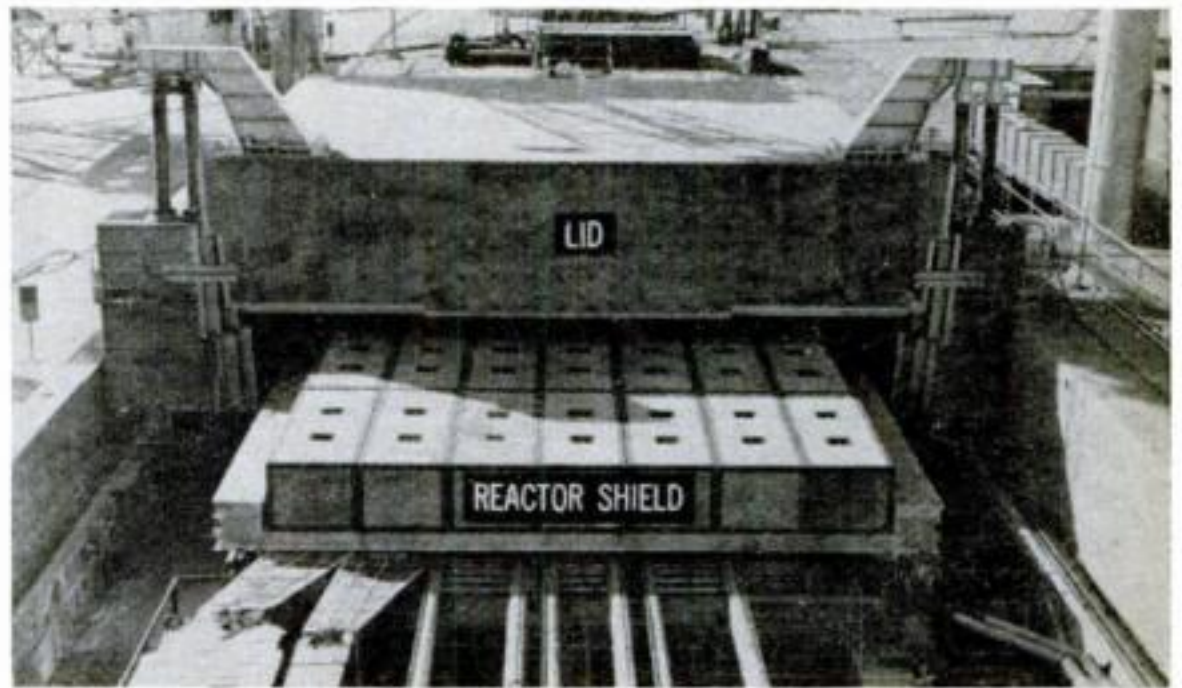
STRING OF DOLLIES, each carrying one baggage container, is hauled to the terminal to speed delivery to passengers.

in six to eight minutes. It utilizes four Glide-Aire pads—Ford's ground-effect mechanism—on the bottom of fuselage-shaped aluminum containers. Floating

makes them easy to push out of a cargo hatch and down a Jeep-mounted conveyor onto dollies. Air for flotation is provided by a compressor on the Jeep.

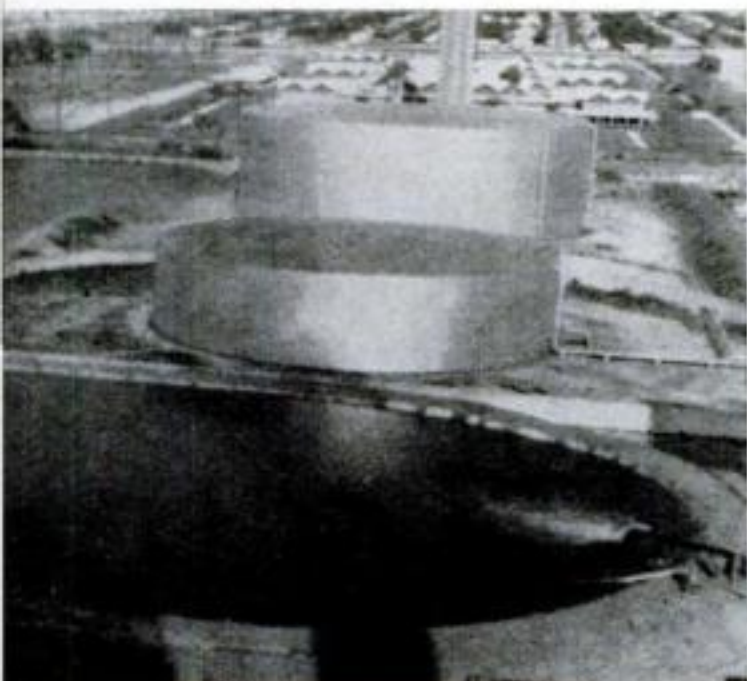
Mammoth lid for nuclear reactor

This huge 1,500,000-pound concrete cover rolls on 104 wheels. Shut, it helps seal in radiation from an underground nuclear reactor at Convair's plant in Fort Worth. A push of a button moves the 332-cubic-yard lid from full-off to full-on position in eight minutes. An old World War II B-24 bomber assembly-line puller does the work.



for banks, covered the area with plastic sheeting to forestall seepage, and then pumped in 5,500,000 gallons of water to a depth of five feet. From there on, the

going was easy. A crew emptied the 28-foot-high, 128-foot-diameter container, attached cables, and hauled it with three tractors. The job took 4½ hours.



as it rounds right-angle bend.



3. In place at last. The man-made lake was then drained.

Tokyo



By Frank Harvey

"**H**OW long is the runway?" I had asked Capt. Joe Blaylock. "11,700 feet," Blaylock said. "No sweat."

But I did sweat a little. The Saucy Sixty, a KC-135 jet tanker, was loaded as heavily as any plane Blaylock had ever flown in his long career in the front cockpit of jet tankers. There's more than 7,000 air miles between Tokyo, Japan, and Seymour-Johnson Air Base, North Carolina. We'd be flying it nonstop and non-refueled.

There was another spice to this trip: We hoped (dimly) to break the long-distance unrefueled speed record from Japan to the east coast of the United States. Our three navigators, Maj. Marion Ward, Lt. John Trask, and Lt. Don Huggins, had huddled in the weather office peering wistfully at jetstream wind patterns we might hope to pick up en route.

"Not much chance, actually," Trask had said. "The jetstream winds are light in summer. We'll be lucky to get a little 50-miler on our tail."

As aircraft commander, Joe Blaylock had gone through a complicated mathematical computation involving the gross weight of the plane, the altitude of the field, the temperature of the runway, the wind conditions, the extra push they could expect from water injection, and half a dozen other items. The figure of 9,400 feet emerged. This was the point where we could expect the Saucy Sixty to stop rolling and start flying.

"That's if we have our expected temperature of 67 degrees Fahrenheit," Blaylock added, almost as an afterthought. "If it's hotter, we'll have to roll a bit farther, of course."

I didn't ask any more questions. Better to climb happily aboard, not sweating, than get involved in an iffy matter like

Blaylock, a jovial Dr. Jekyll ... turned into a slit-eyed Mr. Hyde as he prepared his monstrous bird for takeoff from Yokota AFB



Electrical specialist Sgt. John Kelsey had inspected the ailing jet pod and pronounced it "well"

7,000-mile flight in a jet tanker

to Carolina

in 12½ Hours



KC-135

engine failure just before you reach 9,400 feet, with you moving about 200 m.p.h. and weighing (as they had said) 278,000 pounds. Or think about how you'd stop this monster before it porpoised off through the fields into the mouth of that railroad tunnel located (as the Yokota Air Base ops officer had pointed out) just off the edge of the field.

Trouble in No. 3 pod. About 40 minutes before takeoff time, Sgt. Donald Winch, assistant crew chief, found a puddle of oil under the No. 3 jet pod. Sgt. Buron McKissack, maintenance boss of the plane, came over for a look.

"I don't think it's anything serious," McKissack told his crew, "but I reckon you boys better pull the covers."

I watched Winch, McKissack, et al, unscrew the covers of the jet pod and stare into the front end of the compressor. Winch took a rag and wiped up some oil at the base of the blades. All hands peered interestedly to see if more oil would collect. None did.

"No problem," McKissack announced stoutly. "Probably just overfilled. Button her up, men, and let's give her a test."

But 40 minutes later, sitting in the jump seat just behind Capt. Blaylock and co-pilot Bill Bry, I was still thinking of No. 3 (even though Winch, McKissack, and electrical specialist Sgt. John Kelsey had tested her, and she'd screamed very faithfully).

Joe Blaylock, a smiling and relaxed Dr. Jekyll when you had a beer with him in the Officers Club, had somehow turned into a curt, slit-eyed Mr. Hyde as he finished up his preflight check and prepared to commit his monstrous bird to takeoff. I heard him say to Bry on the intercom, "Now get this. We need 118 knots at No. 7 marker. If we haven't got it—if we're even five knots shy—we abort. Understand?"

"Yes, sir," Bry's voice answered crisply.

"We figured the takeoff roll for 67 degrees F.," Blaylock said. "Operations said we have 70."

"We had 70 at the briefing, sir," Bry said. "We have 72 now."

How much farther, I wondered, must you roll if you have 72 instead of 67?

Toeing the mark. Blaylock used every inch—right down to the green marker lights—when he turned upwind. And then he halted way off on the side, with the nose pointed toward the center stripe. "May need the extra feet," he told Bry. "I'll line up after we start rolling."

We sat there, the sound of the jets feeble and remote through my padded earphones. Ahead, the runway, marked with the black-rubber burns of thousands of landings, disappeared into the Tokyo murk.

"Four minutes to takeoff," Blaylock said.

I felt a hot trickle dart out from under one armpit and coast down my side. Joe Blaylock was probably right about the length of the runway, but he'd miscalculated the sweat threshold of at least one of his passengers.

"How's she look?" Blaylock asked after a while.

"Green across the board," Bry said in a tight voice.

"We're two minutes early," Blaylock said, "but we're cleared. Let's roll it . . ."

His right hand moved the nest of throttles forward, and the feeble hissing of the jets rose to a blowtorch roar. The big plane trembled and tugged as Blaylock held it with brakes. The needles of the four dials that showed the percent of power the four jets were putting out moved reluctantly upward—and stopped well short of the top.

"Water," Blaylock snapped.

Bry flicked a switch and something

CONTINUED

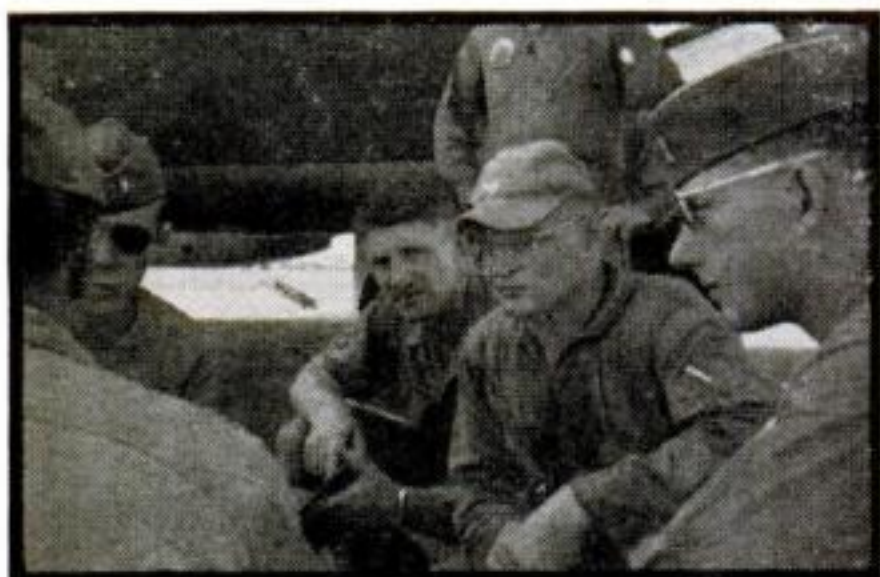
129

At 278,000 pounds, we needed every inch of runway

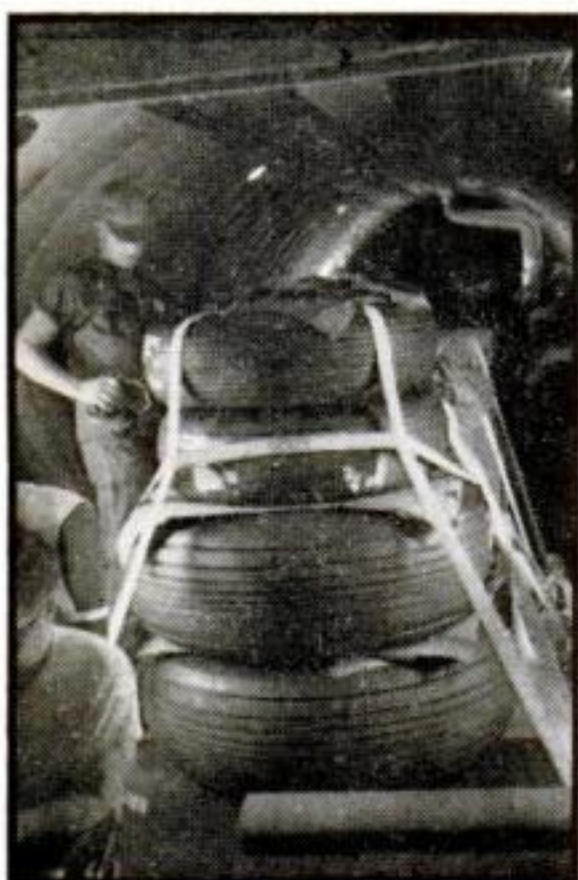
*A weary
passenger
loses
interest
in
"Fandango
Rock"*



*Asst Navigator
Lt. Don Ruggins* *Sgt.
Don Winch*



*Sgt.
Burton McKissack* *Co-Pilot
Bill Bry*



*Sgt.
McKissack
inspects his
spare tires
brought
along
in case of
failure
overseas*

that resembled a controlled dynamite blast took place in the engines as water injection began. The power needles hastened up the dials to the top. The big tanker was vibrating savagely. Joe Blaylock lifted his toes and we began to roll—so fast that my body sagged in the jump seat as we angled in and picked up the center stripe.

"Coming up on decision marker," Bill Bry's voice came, clear and sharp, over the intercom. "Coming up on Marker 7 . . . 3,800 feet . . . now!"

We'd made our first hurdle. We had 118 knots. The concrete raced under our nose. "Coming up on critical engine failure," Bry said sharply—and in an instant, "Now!"

The takeoff. Blaylock's hands left the throttles and took the yoke—and Bry's hand was on the throttles a split-second behind. I could see the end of the runway, rushing at us. We made no effort at all to leave the earth. Then the big nose hid the rest of the runway and all I could see was a Japanese highway with little cars scooting along it, and behind the highway the high mouth of a railroad tunnel.

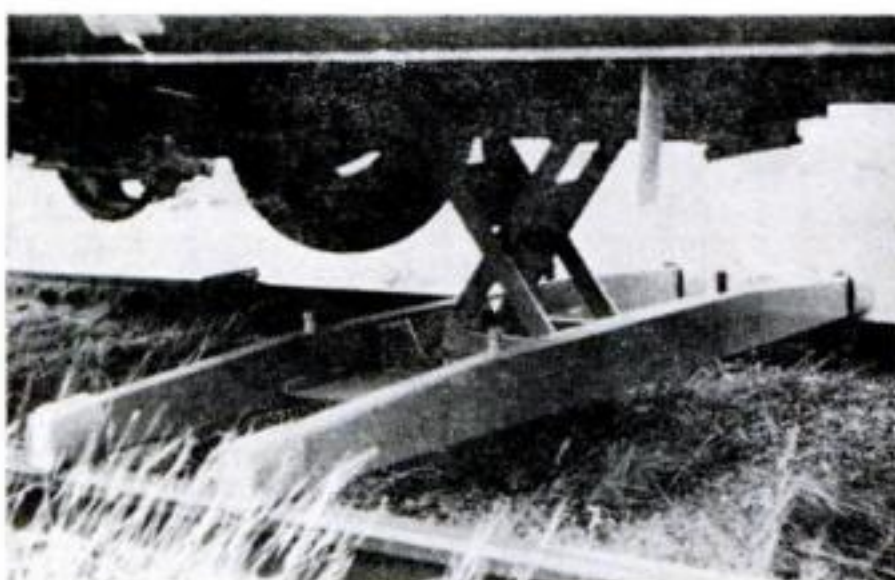
Joe Blaylock's shoulders hunched back and he pulled powerfully on the yoke. The tanker's nose tilted high. I felt a wallowing motion, heard the wheels thump home, and then came the thrill. No clawing desperately over the rim of the tunnel with this bird. She lifted clean and alive like a fighter, heavy as she was. We were 500 feet above the tunnel when we passed it, easy, safe, no sweat, exactly as Joe Blaylock had predicted.

Flying in a windowless jet tanker is roughly like sitting on the floor in a noisy toolroom. Unless you're up front, you have no sensation of motion after you climb into the smooth air of high altitude. You drink more coffee than you need, just to be doing something. You shiver, even sitting under a heater. The lights are so poor it's asking for a headache to try to read. The smart thing to do is sack out, but on this trip there was just one bunk—and it was reserved for co-pilots Bill Bry and Lynn Dyes, who spelled each other during the flight.

[Continued on page 230]



1. Converted Volkswagen drives across track of Long Island Rail Road.



2. It's raised on jack, swung 90 degrees.



3. Flanged wheels lowered, it rides on rails.

VW gandy wagon

Volkswagen station wagons and pickup trucks have replaced the old handcars on New York's Long Island Rail Road. They are equipped with retractable flanged wheels to supplement those with rubber

tires so they can ride on rails as well as highways. With the vehicle straddling the track, a built-in electric turntable jack raises it and spins it 90 degrees to set it on the rails. At end of line, the jack can turn the VW completely around to start it on its return trip.

Navy frogmen carry ears

New portable sonar equipment is tested at right by a Navy frogman for locating objects under water.

Reflected sound waves from its searching beam are transmitted to the diver through earphones. The device is battery powered.



F. C. HAVECKER, retired inspector for a rubber manufacturer, interrupted his gardening to bring out chairs for the interview.



Did you pay any attention to the Democratic Party convention?

... As an American citizen I say it was a disgrace to the country the way they criticized the President ... telling Russia how ill-prepared we are and everything else ...

INSURANCEMAN H. J. WITTENBAUER switched off the TV (he was watching the Republican platform deliberations) and came out on the porch.



Do you approve or disapprove of the way Eisenhower is handling his job as President?

Approve ... He's very loyal, doing everything he can for the betterment of the country.

How Those Political Polls Work...and how good

By Martin Mann

DR. GEORGE GALLUP is solemnly forecasting the outcome of next month's presidential election. Elmo Roper is doing the same. Can they really tell?

Many people trustingly accept political surveys as precise measurements as accurate as figures from the National Bureau of Standards. Others laugh them off as high-class tea-leaf reading, dressed up with scientific hocus-pocus. The truth is, they're a little bit of both. Political polling is cousin—but not twin—to the science of statistics.

Here are the straight answers to blunt questions about the surveys: what they

do, how they do it, where they can go wrong—and why.

How can poll-takers tell how I'm going to vote if they don't ask me personally?

They can't. Surveys gauge the opinion of the entire public, as a group, and don't try to specify separate, individual opinions. It's like flipping pennies. Out of 1,000 tries, about half will come up heads and half tails—but you can't predict which way any one penny will come up.

Why don't they interview me?

Each nationwide survey asks its ques-

ROUNDS WITH THE GALLUP POLL

"I'M A GALLUP REPORTER" is Pauline Fay's introduction of herself when she calls to ask people how they'll vote. Poll responses are con-

fidential. The persons shown at left and on following pages gave PS special permission to take pictures and quote their statements.



are they, anyhow?

tions of 1,500 to 3,000 people. This sample is such a small fraction of the population that there's very little chance you will be included. Even if 10,000 people were questioned every week, it would take 200 years to get around to every adult in the country.

Only a few thousand people? Is that really enough to measure the whole country?

Theoretically, it's plenty. With a sample of this size the *theoretical* odds are 20 to 1 against an error of more than three percent. And they're 100 to 1 against an error of more than five percent.

The hardest thing to believe about

surveys is that huge numbers are not needed for accuracy. Neither will large numbers balance out other mistakes in a poll. The 1936 election survey of the defunct *Literary Digest* polled 2,376,523 people—and was wrong by a whopping 19 percentage points, picking Alf Landon to win over Franklin Roosevelt.

Why? How can a few people speak for millions—accurately?

Too few can't. But accuracy goes up sharply when the sample increases moderately.

Suppose you pick 10 pennies out of a carload and flip them. There are 1,024 possible combinations of the individual

MOST PEOPLE READILY ANSWER

MRS. ESTHER JOHANSON, wife of tugboat fireman-engineer, was reluctant at first, but soon warmed up to the idea with pointed comment.



Which man—Nixon or Kennedy—do you think has the better TV personality?

That's a difficult question to answer . . . Nixon is a pro. He has more finish and polish. Kennedy relies more on boyish charm.

YOUNG GRANDMOTHER, Mrs. Mary Maschi, was on vacation (from electronics plant)—but minding grandchildren. That's Benjy, age 1, on lap.



Which political party do you think can do a better job of handling the problems facing this country today? The Republican Party or the Democratic Party?

Well I'm a Democrat . . . So I think the Democratic Party can do a better job.

pennies (10 2s multiplied together). The chance of getting 60 percent or more heads is two in five. That's a fairly good chance, and you wouldn't be too surprised if you did get 60 percent or more heads in 10 tosses purely by luck. It wouldn't mean a thing.

But suppose you flip 2,000 pennies. There are an unimaginable number of possible combinations (2,000 2s multiplied together, which is 10 followed by 602 zeroes). There aren't nearly so many ways to end up with 60 percent or more heads. The chance of tossing that many heads, purely by luck, is very, very slim—about four in a thousand.

But how can anyone be sure that a sample, whether pennies or people, is a true cross section?

By picking it at random. That brings the laws of chance into play again. There's just as much chance of picking one as any other. The odds are all against picking a biased sample if the choice is genuinely random.

Strangely, it doesn't matter much how big the whole lot is. A sample containing 2,000 pennies will be almost as represent-

ative of a billion pennies as of a million—if it's truly random. Making the selection random is like mixing soup: One spoonful is enough to taste a plate of soup—or a pot full or a vat full, if the soup is well mixed.

Wait a minute. People aren't uniform like soup or stamped out identically like pennies. How can mathematics based on coin-tossing be applied to something entirely different?

There's not as much difference as you might think. Pennies aren't necessarily identical—you can tell whether they are or not by flipping a sample group.

Forecasting votes is particularly like testing pennies. For all practical purposes, both are "either-or" cases: heads or tails, Kennedy or Nixon.

How do the pollsters get a well-mixed spoonful of people—a true cross section of the whole country?

It's complicated, because serious mistakes are easily made. First, the U. S. is divided into 20-odd areas. For each area a list of counties is made. Now the sta-

EVEN PERSONAL QUESTIONS

POLICEMAN HERBERT C. DAVIS was reading the newspaper on his stoop (assisted by 2½-year-old Kathy) when Mrs. Fay came up the walk.



What do you think is the most important problem facing this country today?

... The problem of communism and its spread throughout the country. I don't think it's anything to do with party ... it's the job of the FBI. They have nothing to do with politics.

MRS. VINCENT TERRACIANO, wife of a salesman who is active in local politics, held firm opinions. Her vote was already committed.



What do you think was the best argument to get people to vote Democratic this November?

There are so many issues ... I'm trying to think ... I like Kennedy. I like him very much. I think he's got a lot of stamina. He knows what he's saying.

tisticians pick a number out of a book of random numbers—a fancy way of pulling a number out of a hat.

The random number serves as the key. It tells which counties are to be used, and also whether city, town, or rural residents of those counties are to be interviewed.

The drawing process is repeated, using U. S. Census maps, to select Census "tracts" within the chosen counties, and then city blocks or rural sections within the chosen tracts.

In the block (or section), the poll takers ring successive doorbells until they get 8 or 10 interviews. They work afternoons, evenings, and weekends to catch working people at home. The ultimate selection of a particular person follows some simple rule, such as: one day choose the oldest adult woman then at home; the next day choose the youngest adult man.

This method is hardly foolproof—particularly in the last stage, which depends on people—specifically the housewives and schoolteachers who work at interviewing in their spare time. It selects a cross section that is only a fair approximation of the ideal sample required by

the mathematical laws of probability—making actual error greater than theoretical error.

Hold on. This sample that's chosen so laboriously ... It's a cross section of adults. But not all adults vote. Doesn't that throw the political surveys way off?

Very embarrassing question. There's no law in the U. S. forcing people to vote, and about 40 percent of those eligible don't cast their ballots. That 40 percent punches a hole in a survey big enough to drive a troop of dark horses through.

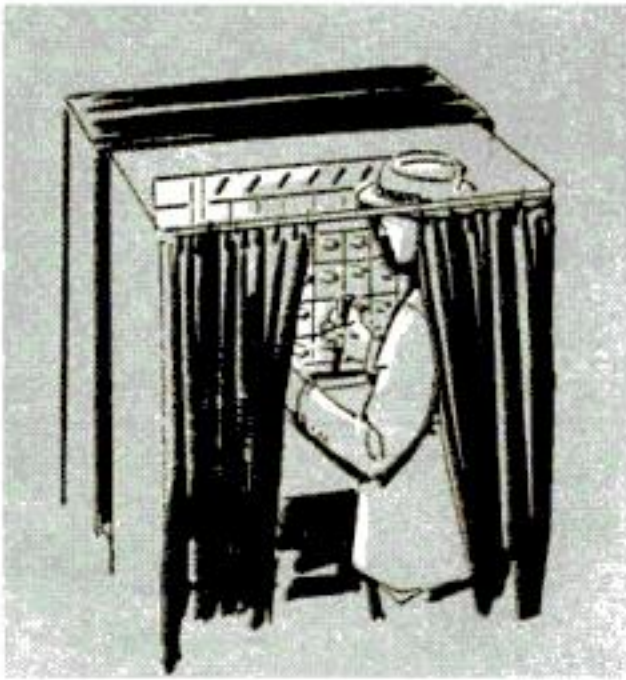
For example: Suppose a poll of 2,000 people reveals that 1,100 prefer Candidate A and 900 prefer Candidate B. But about 800 of those 2,000 won't vote. If most of the nonvoters are supporters of Candidate A, his less popular opponent will win easily. Only votes count.

Now what? How can pollsters get around the nonvoting 40 percent?

Simple. Throw them out—that is, exclude the replies of the people who won't

[Continued on page 236]

How a Voting



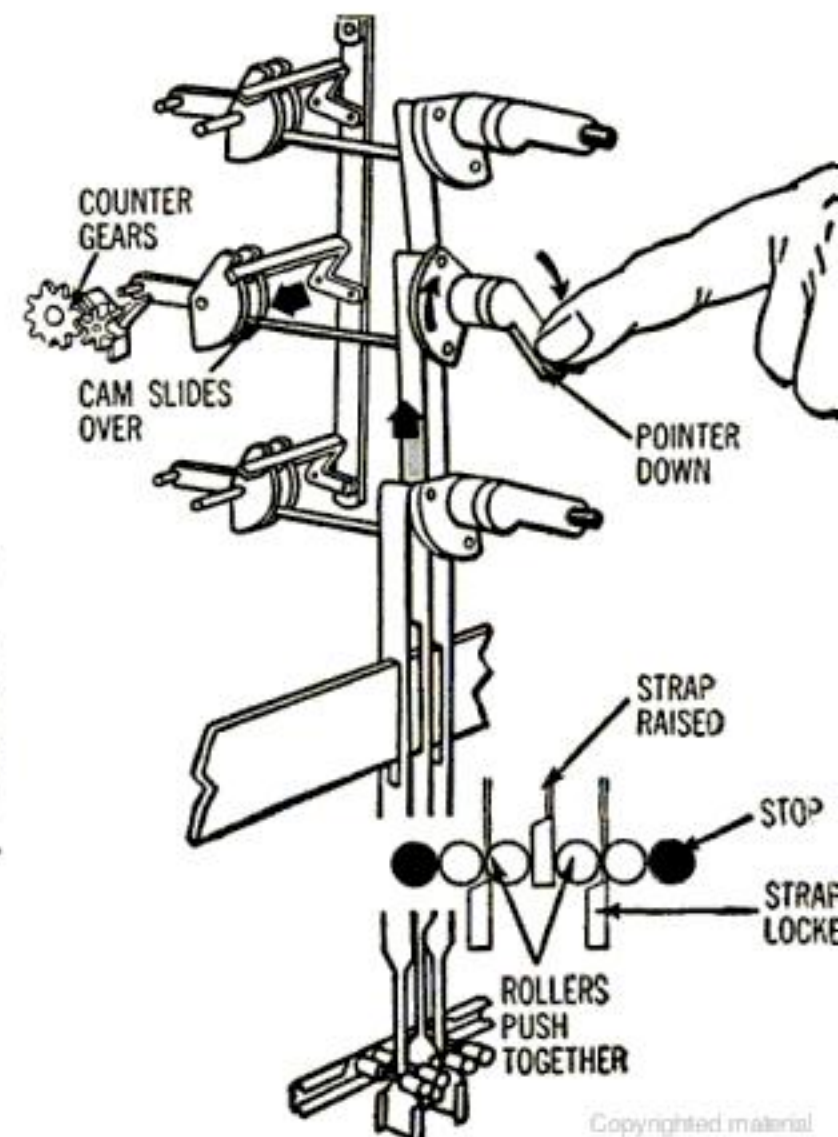
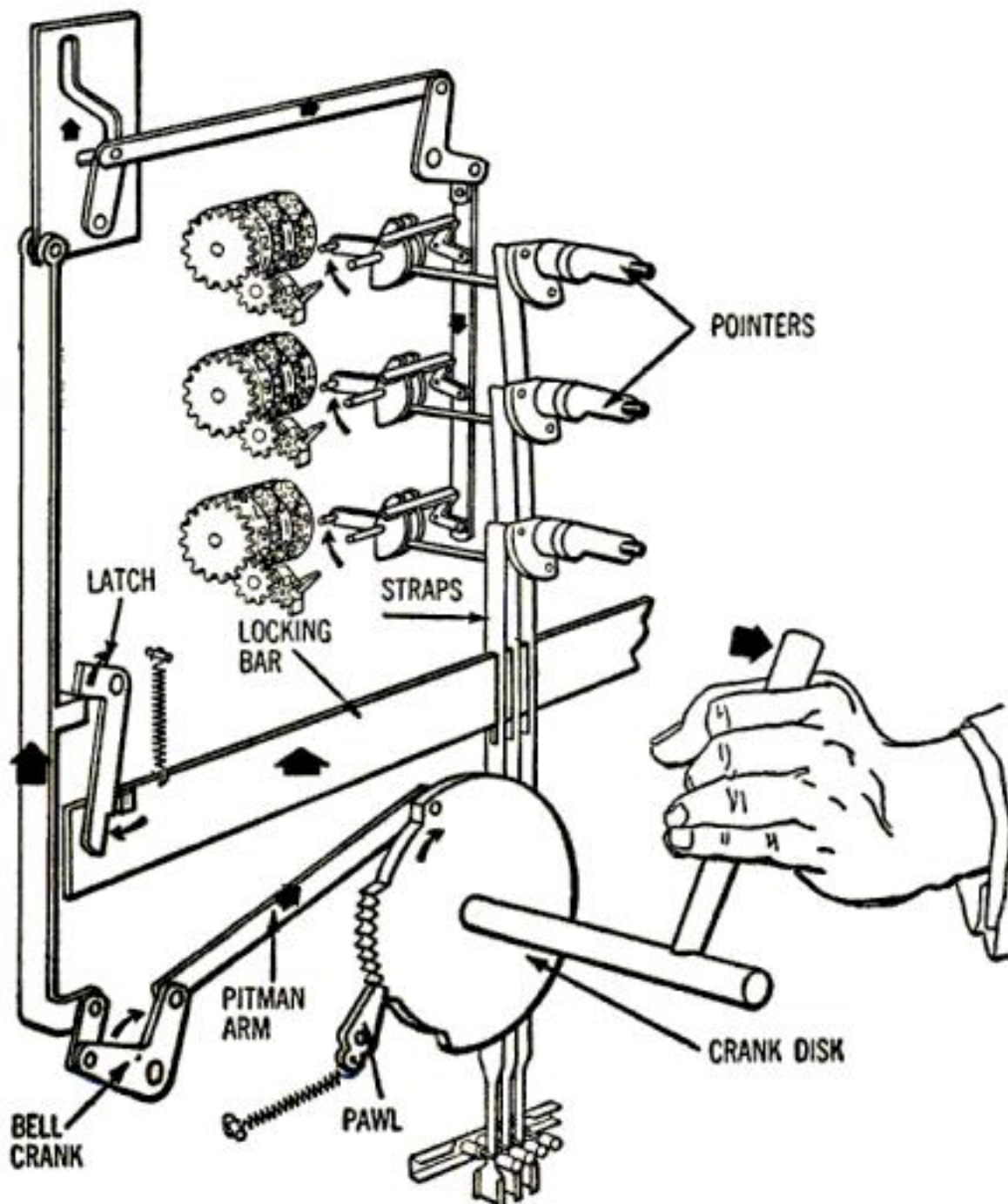
TO CAST HIS BALLOT IN SECRET, a man entering the booth closes the curtain by swinging the lever to the right. This also turns a crank disk, working two pitman arms (only one is shown below). Through bell cranks, the arms trigger a latch on each side, releasing a spring-mounted locking bar, which snaps up. (The bar runs through a slot in each of the metal straps connected to the selection-lever pointers and locks them until it is thus released.) Now the pointers are free, ready for voting. Ratchet teeth on the crank disk, with an ingenious pivoted pawl, prevent reversing the lever once you begin to move it. When the pawl slips past the last tooth, it is free to flip the other way for the return of the lever, as on the facing page.

NEXT month thirty million Americans will vote by flipping machine levers. Every vote will count. Unlike ballots, machines permit no disqualifying mistakes.

The first voting machine was used in an election in Lockport, N.Y., in 1892. Today machines are used in all but five

TO RECORD HIS VOTE, a citizen swings down the pointer of his choice, raising the strap connected to it. Bottom ends of straps hang between small rollers in a rigid channel, with stops at both sides. Enlarged end of strap, rising between two rollers, forces them aside, crowding all others so that no other strap in that group can be raised.

OFFICES	1	2	3	4
	GOVERNOR	LIEUT. GOVERNOR	STATE SENATOR	JUDGE
DEMOCRATIC	MARSHALL	BABSON	JONES	HOOVER
	SANFORD	SAMUEL	AMEND	
	JENSEN	KARMINS	MEYER	
REPUBLICAN	RAWSON	ANTHONY	KENNEDY	SMITH



Machine Works

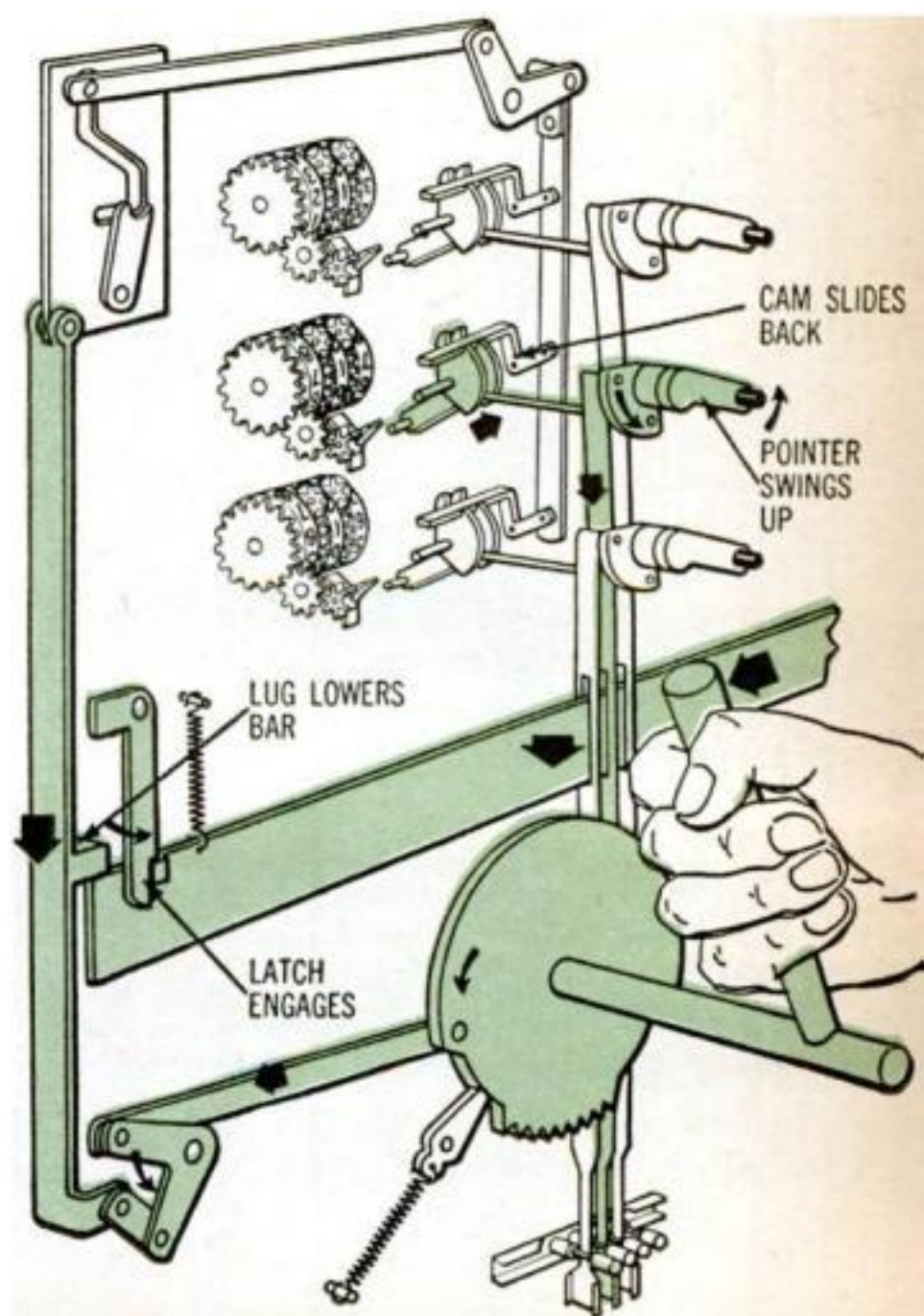
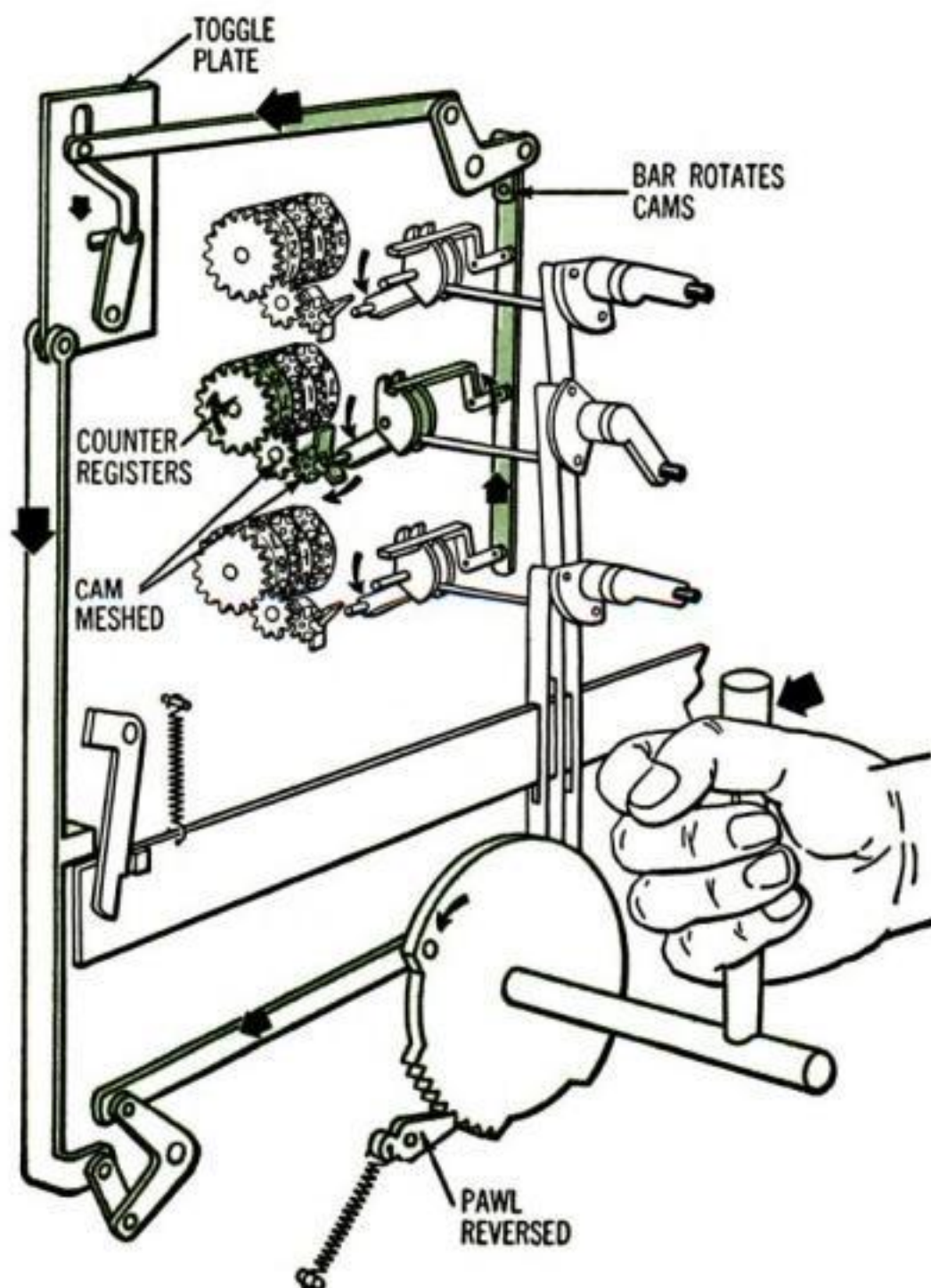
states; in six they are mandatory at every polling place.

Though expensive (\$1,500 to \$1,800 each), machines pay by reducing election costs and eliminating expensive recounts. Another advantage is that they give quick returns after the polls close. They require little maintenance, last a long time, and,

some politicians believe, help draw voters to the polls.

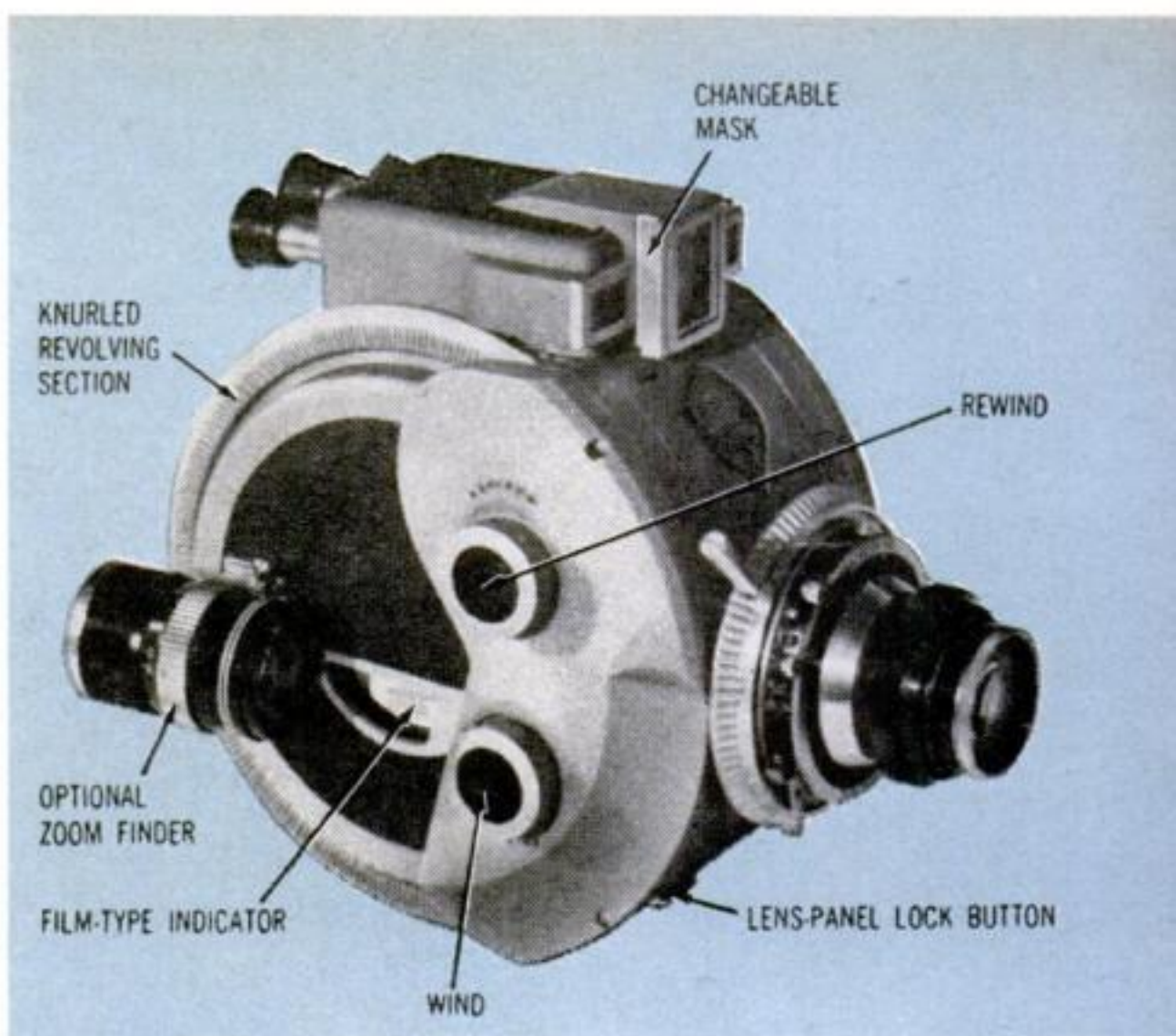
Interlocks prevent pulling the lever for too many candidates, or voting both Yes and No on a question. A paper roll permits write-in votes. The mechanism shown is made by Rockwell Manufacturing's Automatic Voting Machine Division.

TO CHANGE HIS VOTE, the user need only flip back up a selected pointer and swing down another. But stops and rollers, previously set up, let him vote only for the right number of candidates (one mayor, four councilmen, for example). Swinging a pointer down slides its registry cam into engagement with a three-digit counter that totals the votes for that candidate. When he has made all his selections, the voter swings back the big handle, with the ratchet pawl now reversed (below). The crank disk and its linkage first pull down a toggle plate (top left below). Through a bell crank this rotates all pointer cams, but only those in mesh with counters register votes. Next, lugs pull down the locking bar as below at right. The bar pulls down the straps, flipping up all down-swung pointers, ready for the next voter. Finally the mechanism opens the curtain.





**Color? Infrared?
Fast-action? No fuss
and fumble with extra
cameras to match
film to subject when
you use the new—**



3-in-1 Camera

By M. Robert Beasley

IF YOUR shoulder is sagging under the weight of three or four cameras, hold on. Your burden's about to be lifted—and all those cumbersome straps, flaps, and separate lenses will merge into one consolidated whole, like the split image of a range finder. A new 35-mm. camera with one shutter serving three film chambers should hit the market by the first of the year.

By simply revolving the lens mount, you can switch from one type of film to another without tedious mid-roll rewind. Or, if you're sticking to *one* film while covering a wedding or family reunion, you can load all three chambers with it, for over 100 exposures without reloading.

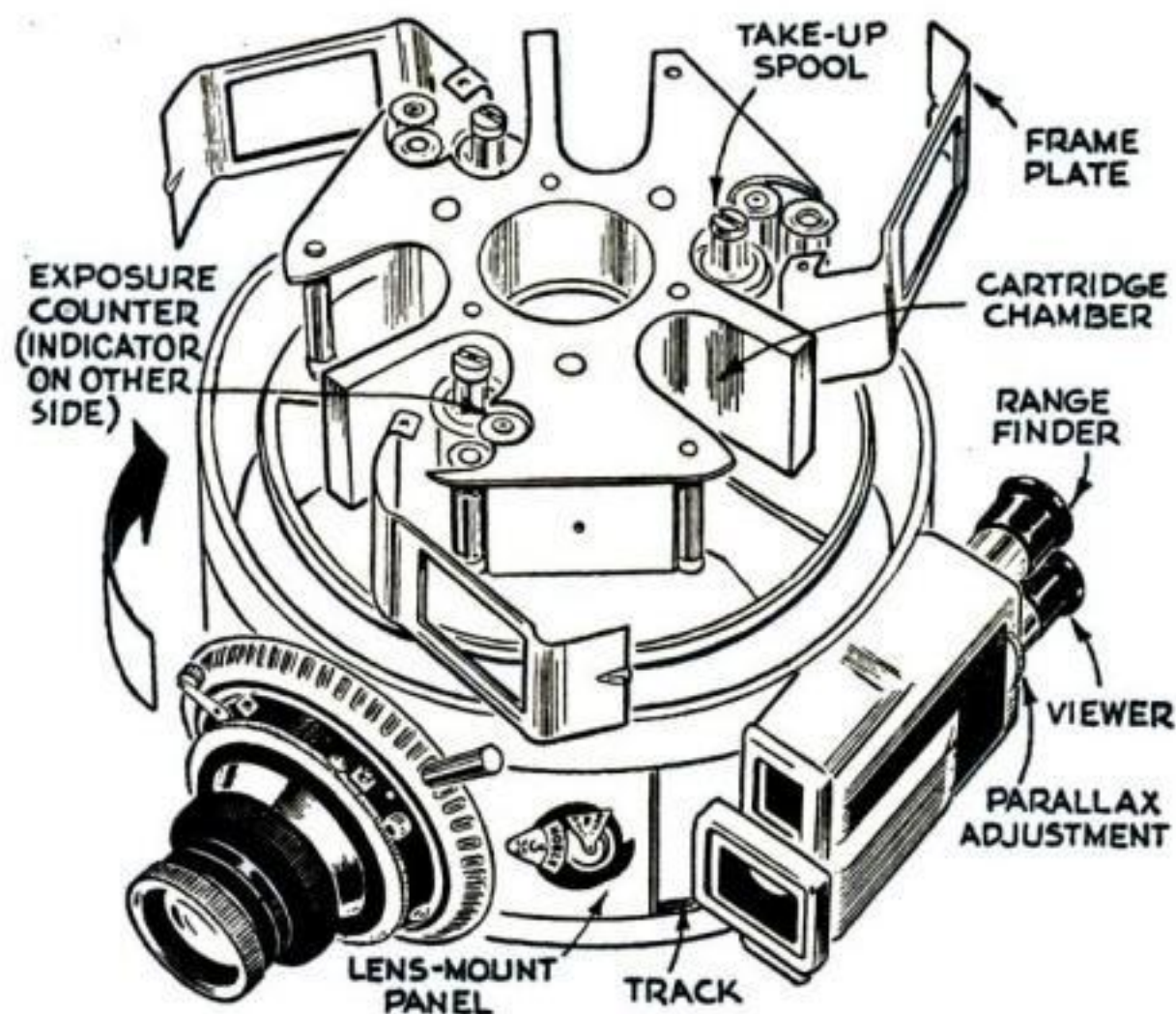
When 35-mm. cameras started to come into their own, film selection was no problem. You either chose color for two-by-two transparencies or black-and-white for enlarged prints. The versatility of these cameras, however, led to the introduction of an ever-greater variety of film stocks, so that today the 35-mm. enthu-

siast must choose from many types and speeds of film, both domestic and imported. The choice is often a painful compromise, since different subjects and conditions call for different films. The minute you load up with slow color, someone is sure to invite you to a rodeo in the rain.

The three-camera juggler. Sam Noble, the Detroit inventor of the Noble 3-35, was a nimble three-camera man when he served as an Army photographer. He decided that the lens and shutter components were the most expensive duplication and set out to fashion a camera whose multiple functions would have a single lens mount in common. After much trial-and-error, he developed the custom-made model shown here.

The all-metal camera has more than 250 parts and weighs about four pounds. To change from one film chamber to another, you just disengage the bayonet-type lock knobs marked "wind" and "rewind." Each chamber loads much like a conventional camera, and each has its own exposure counter.

Preventing mix-ups. Film in the "work-



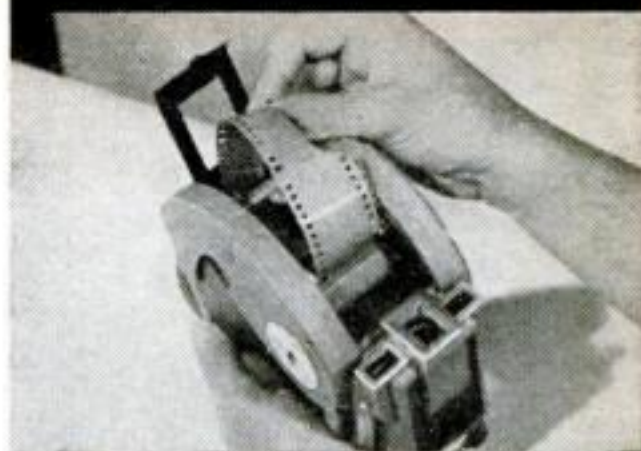
ing" chamber is identified by an index label that appears at a window when the chamber is positioned behind the lens. Two of the chambers have permanent labels for the films you'll use most: daylight color and fine-grain black-and-white. The third has a selector disk listing other types (indoor color, infrared, high-speed black-and-white) so that you can dial the proper label when you load the chamber.

The camera has a Compur MX shutter with settings from one to 1/500 second, and bulb. A built-in split-image range finder is coupled to the 50-mm. f/2 lens. The viewer is designed to accept slip-in masks that adapt it to other lenses; it also has a three-position parallax adjustment.

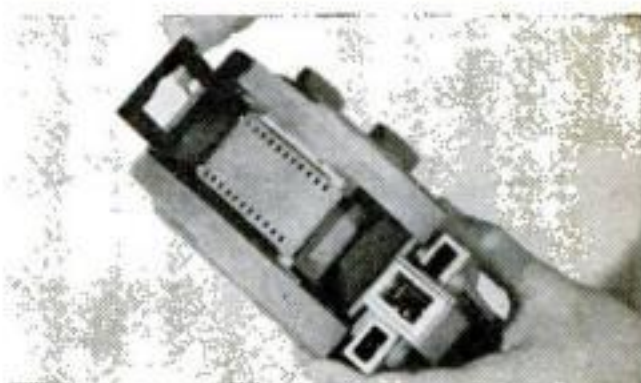
Telephoto and wide-angle lenses are optional equipment, and there's a clip on the body for a zoom-type viewer that spares you the trouble of changing masks. Also optional is a revolving turret for all three lenses to give you the versatility of *nine* cameras in one unit. A flash attachment extends the uses still further. The camera can be used in both vertical and horizontal positions. On the left side is a tripod socket; the thumbscrew of an L-shaped carrying handle also attaches to this.

The camera lacks a few refinements of the best 35-mm. equipment. For instance, there's nothing to prevent double exposures if you're the careless type. And the price—not yet established—will not be low. But it will probably still be cheaper than three separate cameras of comparable quality.

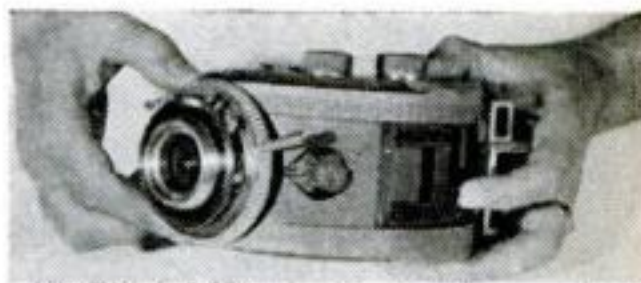
How to Load the 3-in-1



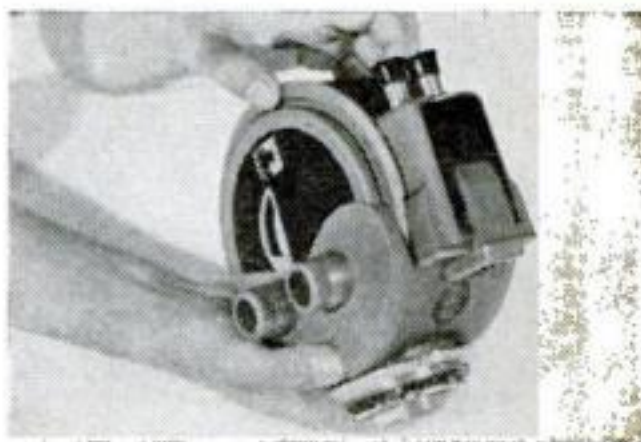
OPEN ONE CHAMBER by sliding back the curved lens-mount panel. Lift hinged frame plate, pull out rewind knob, drop cartridge into place, and push knob back to engage film spool. Draw out film leader and insert in take-up spool.



WHEN FILM IS DRAWN SNUG with two or three turns on take-up spool, drop frame plate back in position. Note wind and rewind knobs on right side and lens-mount track flanking film chamber. Tripod socket can be seen in top picture.



SNAP FRAME PLATE IN PLACE against film, and slide lens-mount panel up track to close the chamber and bring shutter into position in front of film. Advance two frames and set chamber's individual exposure counter on 1 for your first shot.



SWITCH TO ADJACENT CHAMBER by revolving knurled section of body toward you after releasing the wind and rewind knobs from their shafts with counterclockwise turn. When body clicks into next position, press knobs into new shafts.



New Army truck rides on water . . .



. . . or under it; it's all the same.

Floating or submersible trucks

A new series of amphibious trucks being developed by the Army are so snugly watertight that they can even be driven completely submerged. Contracts to design and build prototypes of the go-anywhere vehicles have been let to Ford, GMC, and Chrysler. Two or more will become standard equipment. One is a 3½-ton, six-wheel-drive truck, the other

a five-ton, eight-wheel-drive monster. They will travel on mud, sand, brush, and water. Each is powered by a diesel engine that can be converted later to a variety of fuels, can be removed and replaced as a unit, and will run, stop, and restart while completely submerged. The prototype vehicles do up to six m.p.h. on water, 50 m.p.h. on land.

My Most Embarrassing Shop Moment

"CLEAN the chimney now, with company almost due?" my wife protested.

"No time before. Besides, I've got a new system figured out. Relax."

I wanted to make a log fire—our first of the season—after dinner, but had sworn I'd clean our soot-clogged chimney first.

With a plywood panel braced against the fireplace opening, I banged an old tire chain around from the top of the chimney. It worked fine. Removing the plywood revealed a mountain of feather-light black gook.

I wasn't going to sling that around. Instead I plugged in a powerful old vacuum cleaner I'd just bought to use around my workshop. I hitched on the hose, turned the switch. Silence.

"What's with the juice?" I yelled.

"Iron blew a fuse," answered Ann.

Down in the cellar, I heard the doorbell, and Ann letting company in.

Hurriedly I screwed in a new fuse. Up-



stairs, the cleaner roared into action. When I got there, I walked into a room-sized cloud of soot and three charcoal-gray people.

I'd hitched the hose to the blower end of the cleaner. The nozzle, lying in the soot-filled fireplace, had done the rest.—*J. Pullman, San Diego, Calif.*

.....
Do you have an embarrassing shop blunder that haunts you? PS will pay \$50 for each such experience published. None can be returned. Keep it brief. Address: Shop Editor, Popular Science Monthly, 355 Lexington Ave., New York 17, N. Y.

Mechanics and Handicraft SECTION



PICTURE-WINDOW STORM SASH



WEATHERSTRIPPING .14

How to Winterize Your Home

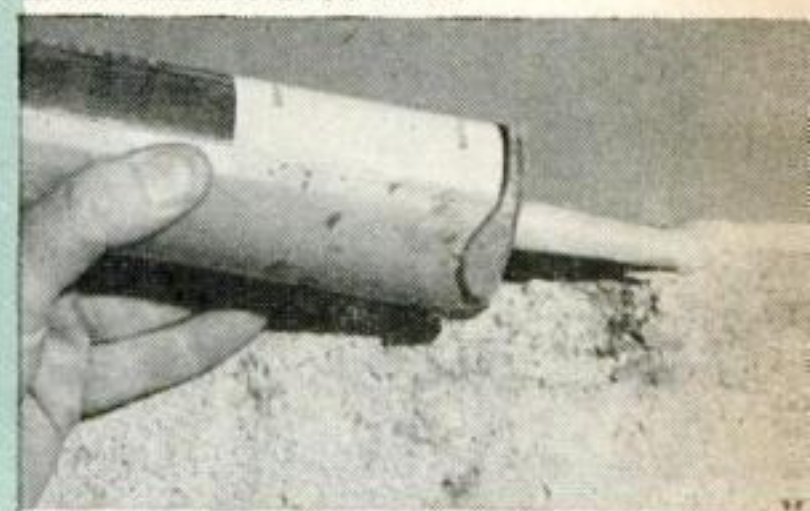
A few simple jobs done now will seal your home snugly against the assaults of freezing weather

IT'S the little things you do that count when you button up your home against winter's blasts. The jobs are small, seldom costly, and often overlooked—but they add up to big benefits in extra warmth, comfort, and fuel economy during the long cold months.

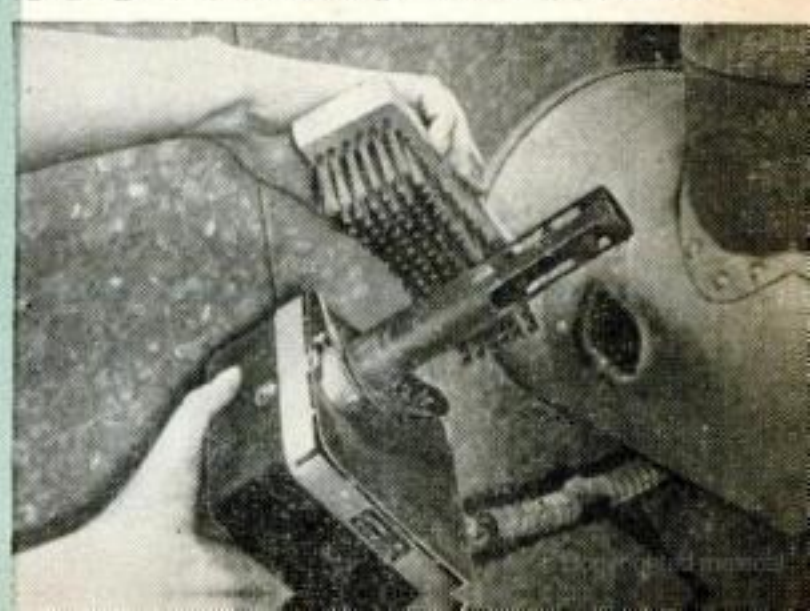
You wouldn't go through the winter with an open window, for instance, yet you're doing the same thing if your house isn't weatherstripped. The hundreds of feet of hairline cracks around your doors and windows add up to a whopping total area—big enough to equal a partly open window. The result if they're neglected: As much as 30 percent of your fuel dollars are gone with the wind.

Most of the weatherproofing methods shown on the following pages aren't costly or difficult. You can do a complete door or window in 15 min-

CALKING...147



SOOT REMOVAL...150





AFTER CUTTING DADOES IN FRAME, slip inner horizontal members in place and lay out dados in them with a straightedge from frame dados as shown. This assures perfect alignment of the grid.



GLUE VERTICALS IN PLACE, working from bottom up to keep horizontals from sagging. Nail in outer retaining strips and paint *before* glazing. This leaves only inner strips to touch up after glass is in place.

LEDGES INSIDE THE GLASS provide 16 niches for displaying knick-knacks, making the storm sash attractive as well as functional. Sash can be removed easily for cleaning the glass (see preceding page).



utes for as little as \$1. If you don't want to weather-strip the entire house at one time, start with the doors and windows that are the loosest fitting and those that face prevailing winds.

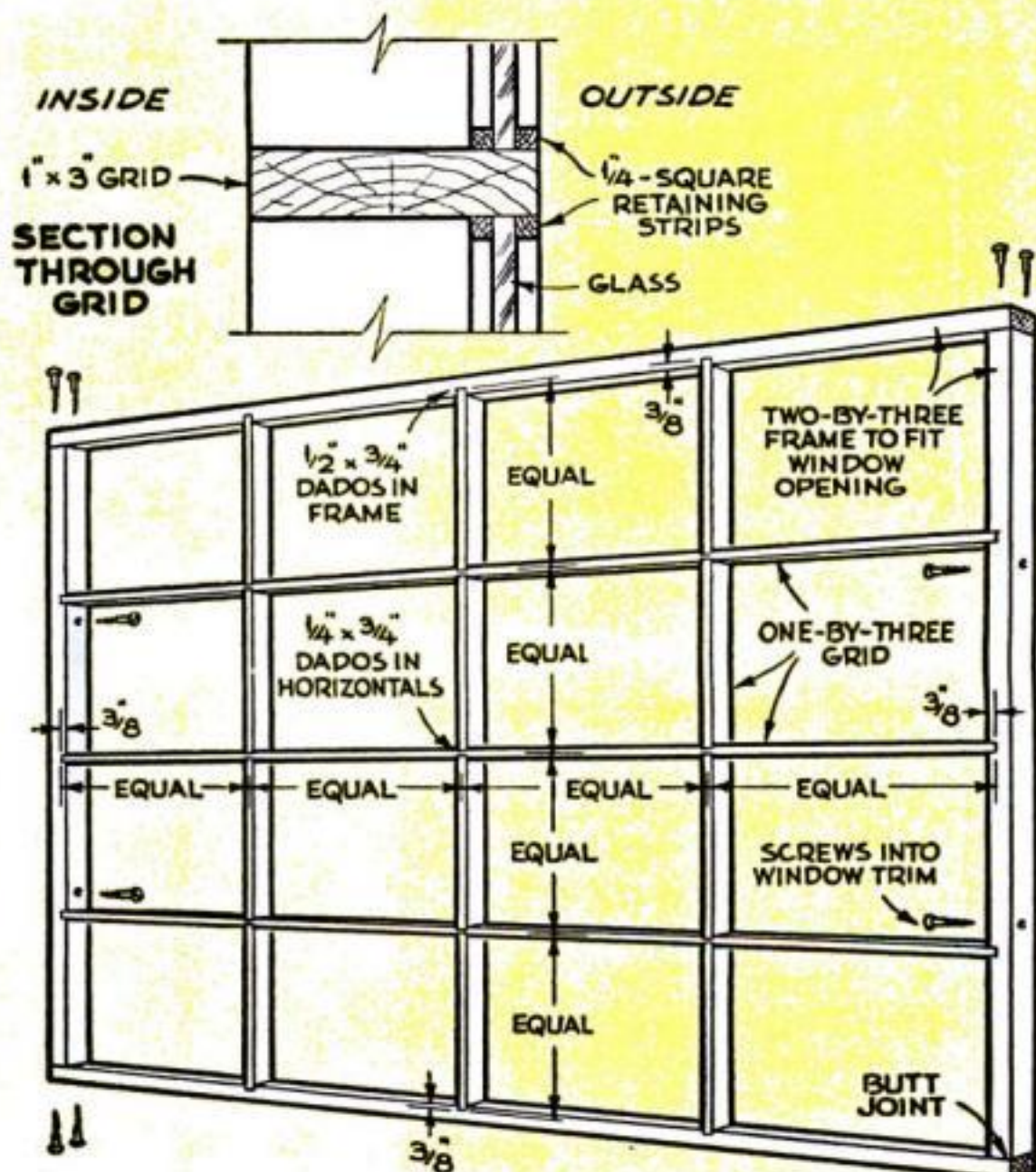
One of the most often neglected cold spots is the giant picture window in today's homes. Because of its size, it seldom has a storm window, yet it's this large expanse of glass—with its high heat loss—that needs a storm sash most.

On this page is a new idea in picture-window protection. It's a storm sash that mounts *inside* the window. Made of small panes of ordinary glass, it can be built to fit any size window. For the summer, it can be slipped out quickly and stored, or you can leave it in place all year. Cost: a fraction that of commercially made storm sash. As a bonus, you get an attractive grid effect with shelves for decorative knick-knacks.

Sealing cracks with calking compound takes only a few minutes and is important protection against both wintertime leaks and springtime repairs. You'll find the latest news on proper calking techniques on the following pages.

Even insulation, usually a big job, can be done a bit at a time—for instance, added in small amounts to take the chill off an especially cold room. Rooms

TO DIVIDE TWO-BY-THREE FRAME into 16 equal parts, measure $\frac{3}{8}$ " in at sides, top, and bottom, and from these marks divide each frame section into four equal spaces to locate centers of grid members. Measure $\frac{3}{8}$ " on both sides of each centermark to outline the dado cuts.



above an unheated crawl space are frequently hard to keep warm. Stapling insulation batts up between the joists in the crawl space is a Saturday-afternoon job that will pay off promptly in more comfort and less fuel waste.

You can also save a remarkable amount of wasted heat by freeing your furnace and chimney flues of soot. It takes only a thin layer of soot to cut in half the heat your furnace puts out. You'll find the proof—and what to do about it—on page 150.

While you're checking the furnace, don't forget the little extras, such as draining the expansion tank, renewing warm-air filters, and bleeding radiators. A surprising number of unnecessary service calls come from home owners who have overlooked these simple chores.

The finned baseboard convectors popular today also require special attention. Dust on the fins can cut heat output to the point where the furnace won't carry the load. Remove the covers and give the fins a thorough vacuum-cleaning. Some hot-water heating systems also require switching over from a summer to winter setting on the domestic hot-water supply to provide adequate heat.

Increasing the moisture in the air may help you feel warmer and more comfortable during the winter. Check into the special humidifier attachments that can be added to warm-air furnaces. Some furnaces are already equipped with such units—without their owners knowing it. To tell if you have one, look for a water line running to the furnace.

Older humidifiers use absorbent plates to evaporate water from a pan. These plates must be replaced every three months or they become clogged and lose their effectiveness.

Newer humidifiers force moisture into the air by atomizing water or vaporizing it, instead of relying solely on evaporation. They are more expensive than plate-type humidifiers, but supply more moisture. Such units can be added to any warm-air furnace, and you can install most of them yourself. Prices start at about \$50.

To be sure your home is adequately winterproofed before the cold winds start to blow, use the check list at right. Every check means more comfort in the home, more money in the bank.

Winterizing Check List:

17 tips for warmth and comfort during the cold months to come



- ☐ **1.** Shut off and drain outside sill cocks to prevent freeze-ups.
- ☐ **2.** Check the roof for loose, curled, or worn shingles and replace them or cement them down with roofing tar.
- ☐ **3.** Clean out gutters and downspouts to keep water from backing up and freezing under the roof, where it will cause leaks.
- ☐ **4.** Batten down the TV antenna—tighten loose straps, replace frayed lead-in—and save an icy climb later.
- ☐ **5.** Use flexible plastic sheet to seal windows not covered with stormsash.
- ☐ **6.** Paint any screens that can't be removed, to prevent rusting.
- ☐ **7.** Seal cracks with calking compound to keep out wind and water.
- ☐ **8.** Draftproof doors and windows with weatherstripping.
- ☐ **9.** Clean the furnace and chimney flues of heat-robbing soot.
- ☐ **10.** Drain the expansion tank in hot-water systems before turning on the heat.
- ☐ **11.** Clean or replace the filters in warm-air heating systems.
- ☐ **12.** Bleed radiators or baseboard convectors to remove trapped air.
- ☐ **13.** Switch over from summer to winter setting on your domestic hot-water supply.
- ☐ **14.** Renew the plates in furnaces that are equipped with plate-type humidifiers.
- ☐ **15.** Get firewood in early so it will be dry when the snow flies; but keep the main supply of wood outdoors to avoid termites.
- ☐ **16.** Lay in ashes or sand for slippery spots, and salt for melting ice.
- ☐ **17.** Check weak fences or trees that might be blown down in high winds, and brace or guy them wherever this is necessary.

WINTERIZING
YOUR HOME

Weatherstripping

New types do a better job of sealing out wind and water, and they go on faster and easier

THIS year's news in weatherstripping is spelled v-i-n-y-l. In half a dozen forms, vinyl plastic now gives you weatherstripping that's inexpensive yet durable and good-looking.

Earlier forms of felt or rubber—while still useful on some temporary, low-cost jobs—have their disadvantages. Felt tends to get out of shape, rubber to crumble or become sticky with age. Vinyl, however, holds its shape and is practically indestructible.

A trio of vinyl seals. For a quick job, there's vinyl tubing, sold in rolls, that you just tack in place. It's tight-fitting, but not as attractive as some other types. One of the neatest is vinyl foam bonded to wood strips. This looks like decorative molding and is virtually invisible when painted to match the woodwork.

Another trim-looking variety is a molded vinyl held in aluminum strips. A narrow version (13/16") is used on household doors, a wider one on garage doors. Price is about 35 cents a foot.

The vinyl inserts in these aluminum strips come in several shapes. A tubular one provides a tight fit against swinging doors and windows, but tends to stick a bit against sliding sash. Special slim-fingered vinyl strips are made for sliding doors and windows where friction must be kept to a minimum.

Sealing off with metal. Although metal weatherstripping is still widely used, it is somewhat trickier to install since it must be placed at the edge of a door or window instead of simply against the face. It is one of the best types for snug-fitting double-hung windows because the metal allows the sash to slide easily. For doors, however, it's gradually giving way to surface-mounted vinyl strips.

Metal spring strips sometimes get out of shape or lose their seal if a loose-fitting door or window shrinks away from them at the edges. Interlocking metal strips avoid this problem, but are harder to install. They consist of two U-shaped strips, one mounted on the door or window and the other on the jamb. Attached to the surface, they're fairly easy to install, but are conspicuous. The concealed type calls for rabbeting the door edge, but provides one of the neatest, most durable jobs you can get.

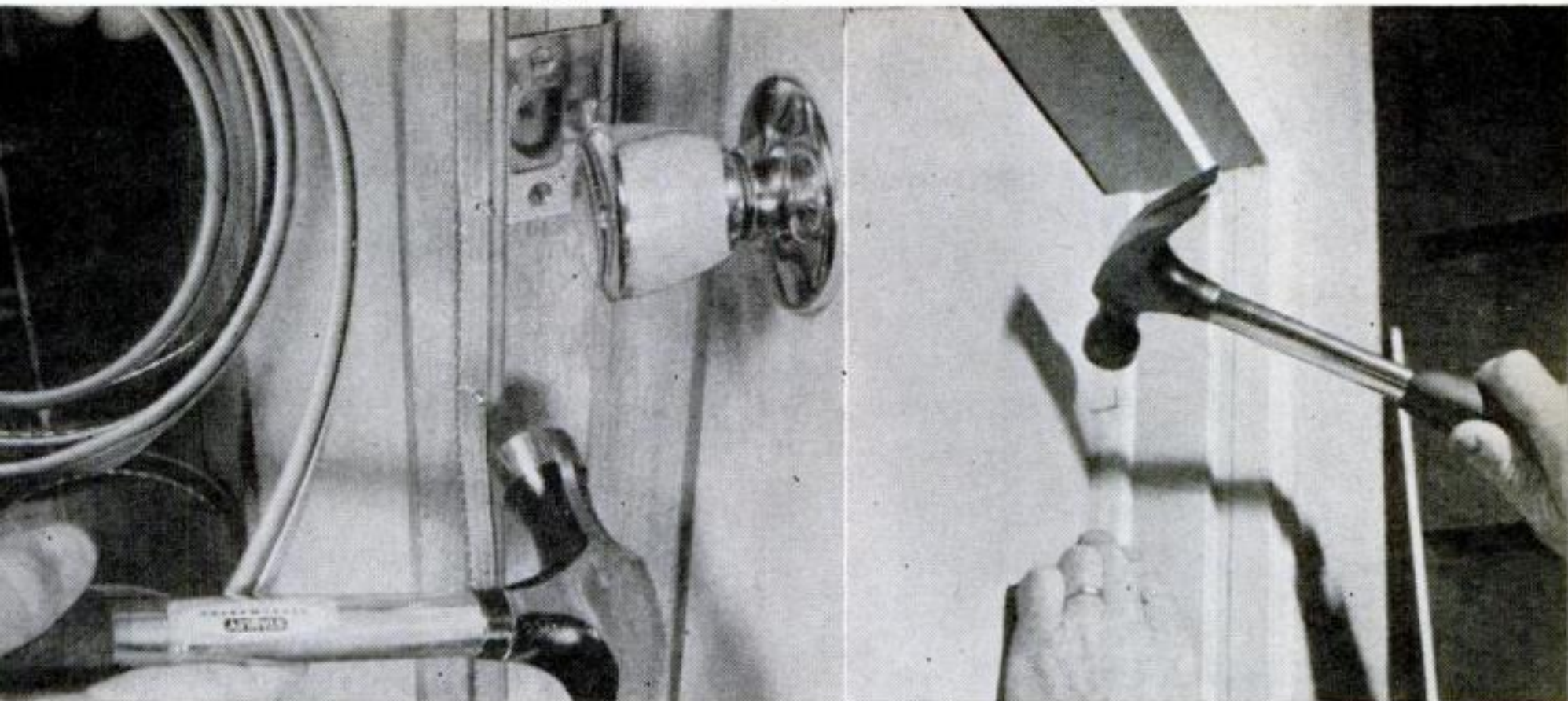
Block that draft. Door bottoms are the most critical points in weatherproofing. Here you find the worst drafts and leaks and, at the same time, the heaviest wear on whatever material you install to stop them.

If your present threshold is worn and uneven, you'll do best to put in a new one that has a vinyl insert. Most of these are aluminum, but this year they're offered in oak, too.

Where you already have a threshold in good shape, you can save money by adding a narrow vinyl-and-aluminum cap strip on top. This cap is made to work in two ways. If you prefer, you can fasten it to the bottom edge of the door instead of the threshold. This takes more work—the door must be removed to do it—but it makes the vinyl seal invisible and saves wear, of course, because you won't be walking on it.

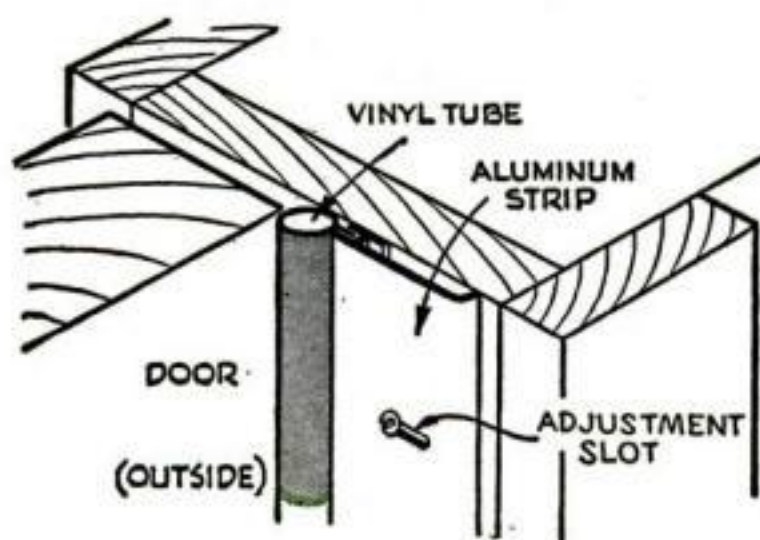
Turn back the tide. No door-bottom seal can be expected to stop a heavy flow of water by itself. An extra rain shield is required to divert wind-driven water. This is usually a separate strip of metal fastened to the outside of the door. It can be either thin sheet metal, which is cheap, or a sturdy aluminum extrusion,

Five of the newer types of vinyl weatherstripping

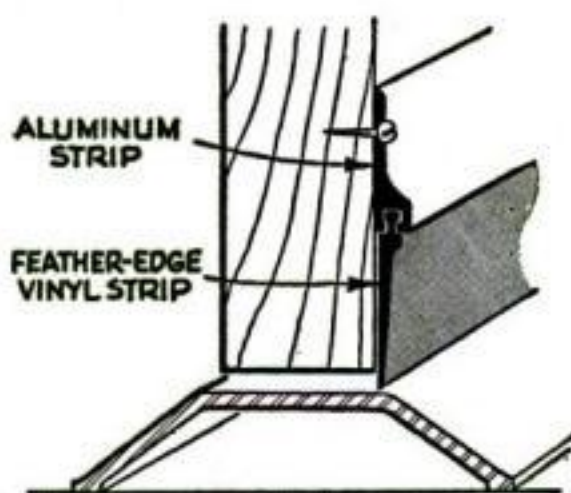


VINYL TUBING, held in a flexible aluminum strip, is cheap and fast to install. For door or window, it comes in 17' coils for about \$1.25. One drawback in some spots is its undisguised look.

VINYL FOAM, bonded to wood strips, has the trim appearance of molding. It's simply tacked on with corners mitered. It costs a little more than vinyl tubing—about \$2 for a 17' kit.



RIGID ALUMINUM STRIPS with vinyl inserts are held on with screws through slotted holes. They look neat, have the advantage of permitting exact adjustment of pressure.

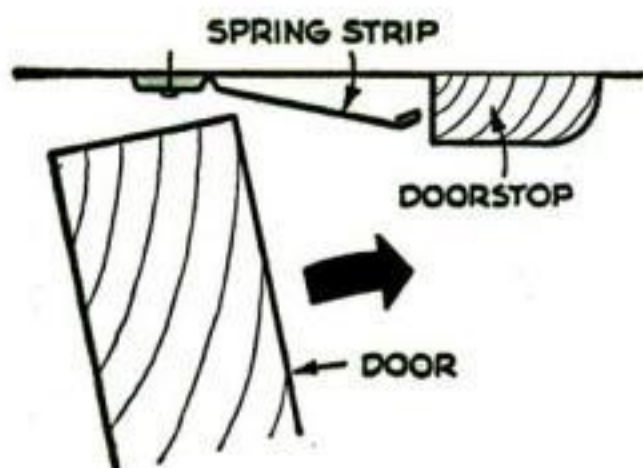


FEATHER-EDGE VINYL, also held in a rigid aluminum strip, tapers to a thin edge. It's ideal for sills and sliding doors or windows where friction must be held down to a minimum.

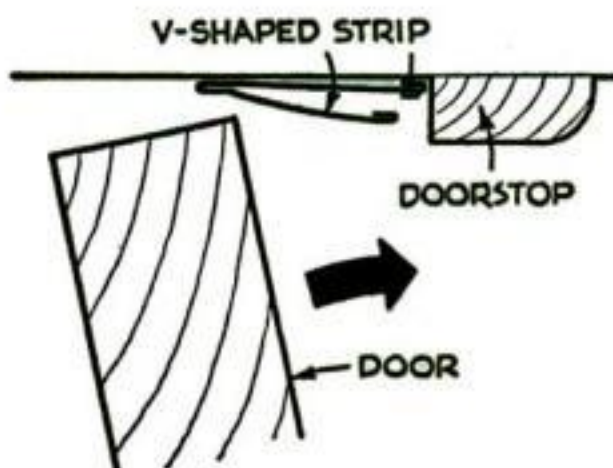


MULTIFINGERED VINYL, one of newest types, has thin edges for less friction but maximum weathertightness. It's good for sliding sash or where wind and rain are severe.

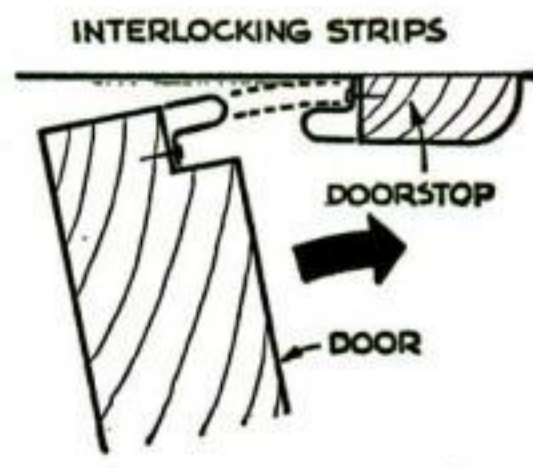
Three types of metal seals for keeping out weather



METAL SPRING STRIP above at left is cheapest, but sometimes gets out of shape. V-shaped strip at center above is more durable, easier to install,



but more expensive. Interlocking strip at right is tricky to install, but provides a tough, long-lasting, and weathertight seal.



CONTINUED

which is trimmer looking but a little more expensive.

You can also get a vinyl-and-aluminum door bottom that has a built-in rain shield. The whole thing goes on in one piece, and you don't have to remove the door to do it. It costs about \$2.

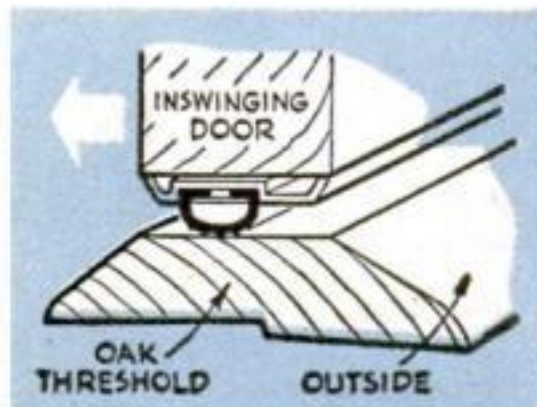
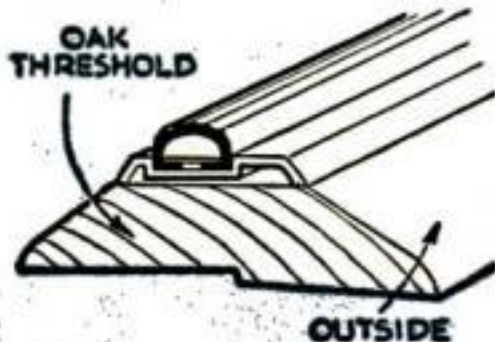
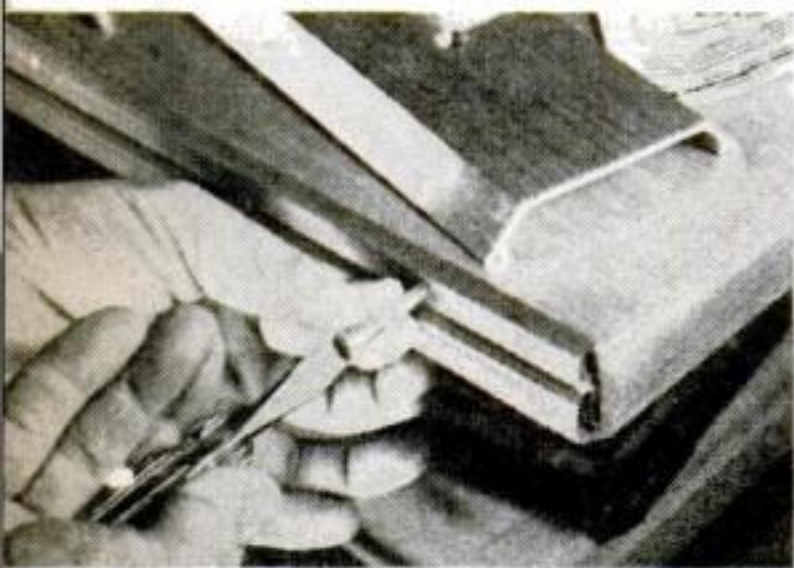
Dam out the flood. Doors that are exposed to wind-driven rain may require an interlocking threshold. This consists of a hook-shaped strip on the bottom of the door that engages another hook-shaped strip on the threshold. The interlocking strips require careful fitting, but once

installed they are almost impenetrable.

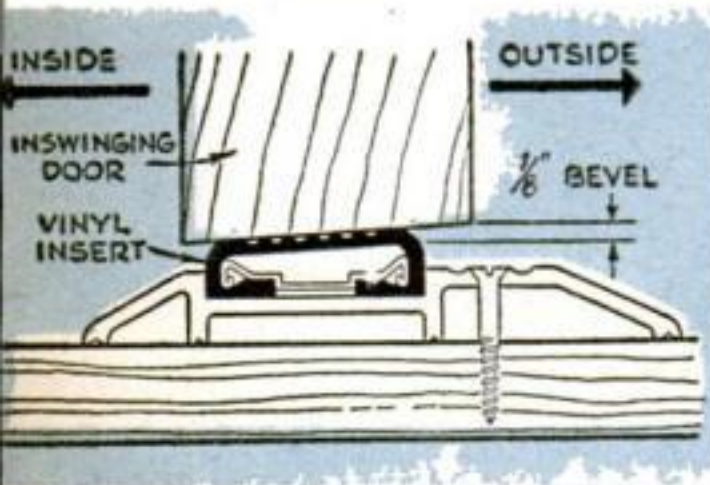
Another type of threshold has a rain drain built into it. Any water that gets past the seal is caught in a trough inside the door and is channeled back outside through holes. This type of threshold can be bought separately or used with other kinds of door-bottom seals.

One of the fanciest door bottoms is an automatic type that swings up when the door is opened to clear the carpet. As the door closes, the vinyl strip strikes stops on the door jamb and is pressed down against the threshold.

Five ways to weatherseal the bottom of a door



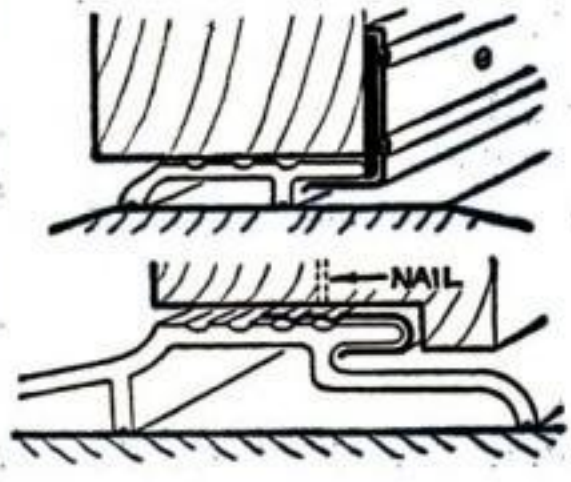
TWO-WAY DOOR SEAL fastens either to threshold, without removing door, or to the door bottom. Fastening to door takes more work, but conceals it and saves foot wear on it.



ALUMINUM THRESHOLD replaces existing wood one that may be worn or loose-fitting. The tubular vinyl insert can be replaced with a new one later if it should become worn.



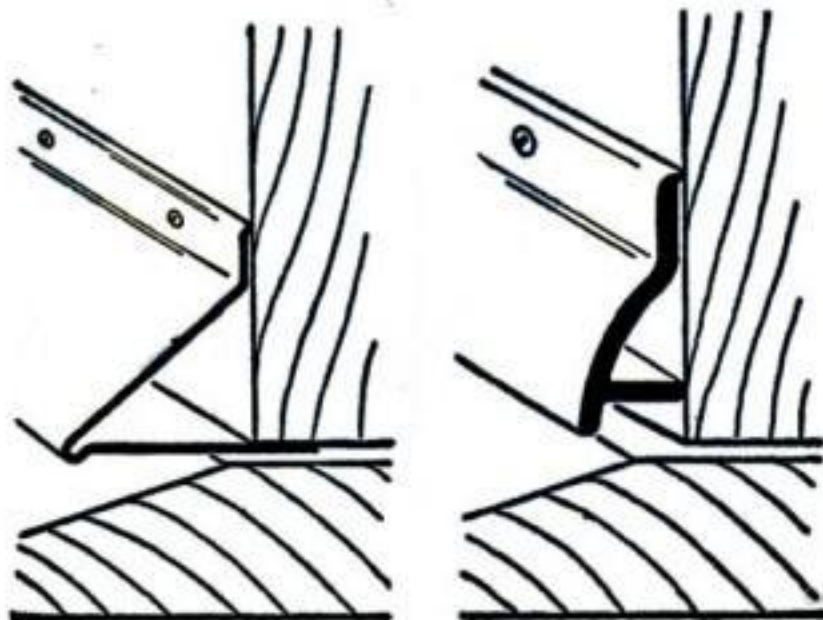
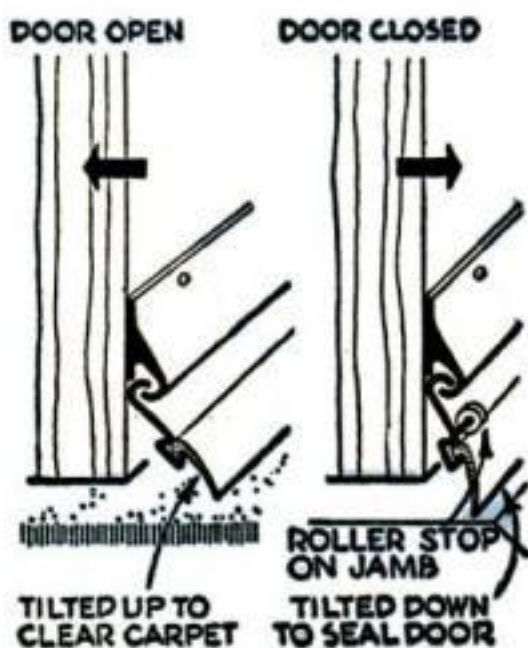
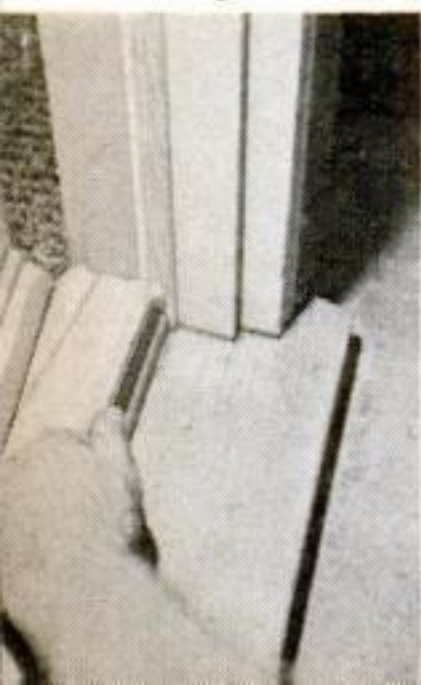
COMBINATION DOOR BOTTOM has a vinyl seal and rain shield in one strip. It can be attached without removing the door, can be used with the existing threshold or put in with a new one.



INTERLOCKING STRIPS come in two kinds. Surface type at top is easy to install, but is exposed. Concealed type at bottom is neater, but requires rabbeting the door edge.

AUTOMATIC DOOR BOTTOM flips up as the door is opened to clear the carpet, then is pressed down tight against the threshold as the door swings closed against stops on the jamb.

RAIN SHIELDS keep water from running under the door, can be added to most door bottoms. Type at left requires removal of door to nail it on; one at right fastens to face of door.



Calking

WINTERIZING YOUR HOME

It's what you do before you seal the cracks that makes the job permanent—or botches it

DON'T cuss the calking compound if a crack opens and water or icy drafts find their way inside the house. Most calking failures are caused by poor preparation or technique. For a buttoning-up job that will last, keep these four points in mind:

- A hairline crack that pulls water into the house by capillary action is too tiny to calk effectively. A bead of compound laid on the outside can easily pull away. It may even form a ledge that helps water get in. The best cure is to open the crack—cut it wider at the surface—to form a deep V in which the calking can get a grip.

- It's not enough just to fill a gap. Overfill it. Then, if the calking shrinks, hardens, or crumbles, or if the joint moves, there'll be enough in the crack to carry on the job.

- Don't rely on calking alone to pack wide or deep cracks. Provide a base by tamping the bottom of the crack full of



DEEP CRACKS should be packed with oakum or steel wool to provide a base for the calking and to set up a second barrier against weather. Small tube of compound shown is handy for single jobs. Key helps squeeze out the material.



WIDE CRACKS like this one in a wall are best filled with knife-grade calking or glazing compound. The material is stiff when applied, stays flexible after it sets. Wet the knife to keep the compound from sticking to the blade.



FOR RUN-OF-THE-MILL JOBS cartridges are quickest and cleanest. Half-barrel gun, in use here, takes only cartridge with plastic nozzle. Standard gun, on sill, houses no-nozzle cartridge, or can be filled with bulk compound.



FOR CALKING HOUSE WALLS, bulk compound can be colored to match. Stir in some house paint or heavy-bodied stain until color is uniform. Thick material from bottom of paint contains most pigment, won't thin the compound.



FOR ROOF JOBS, a black asphalt-base compound is the thing to use. Unlike ordinary calking, it will stick to wet surfaces. You can patch the roof or seal leaky flashing while it's raining and you can readily see the leaks.

oakum—the tarred rope that plumbers use. Steel wool can be used if the calking job is not too large.

- Be sure you get good adhesion. Calking compounds won't stick to dirty or

greasy surfaces, or dusty concrete. Wipe all areas to be calked with turpentine or paint thinner.

Most compounds won't take hold on wet surfaces, either, so work after a dry spell. The exception is asphalt-base compounds. They'll take to wet surfaces, letting you patch a leaky roof even when rain is falling.

Paint may grip calking securely at first, but when it peels, the compound goes with it. Scrape your way down to something solid for a lasting job.

Raw wood is the subtlest enemy of adhesion. Calking may seem to stick fine; then the wood sucks the oils out of it, leaving a dead, dry compound that can't ride out the movement of the wood. Prime raw wood with varnish, shellac, or house paint *before* calking.

Cold weather will interfere with good sticking by making the compound too stiff to flow. Try not to calk when the temperature falls below 40 degrees; if you must work, warm the compound to room temperature.

Which compound to use? There's a confusing variety of materials on the market, but, fortunately, each type will do several jobs.

For wide cracks or exposed places, a stiff compound is called for. Use glazing compound or, for a bit less stiffness, knife-grade calking. Both are too heavy for a gun and must be applied with a putty knife, a wood paddle, or your fingers. Wet the applicator to keep it from gumming.

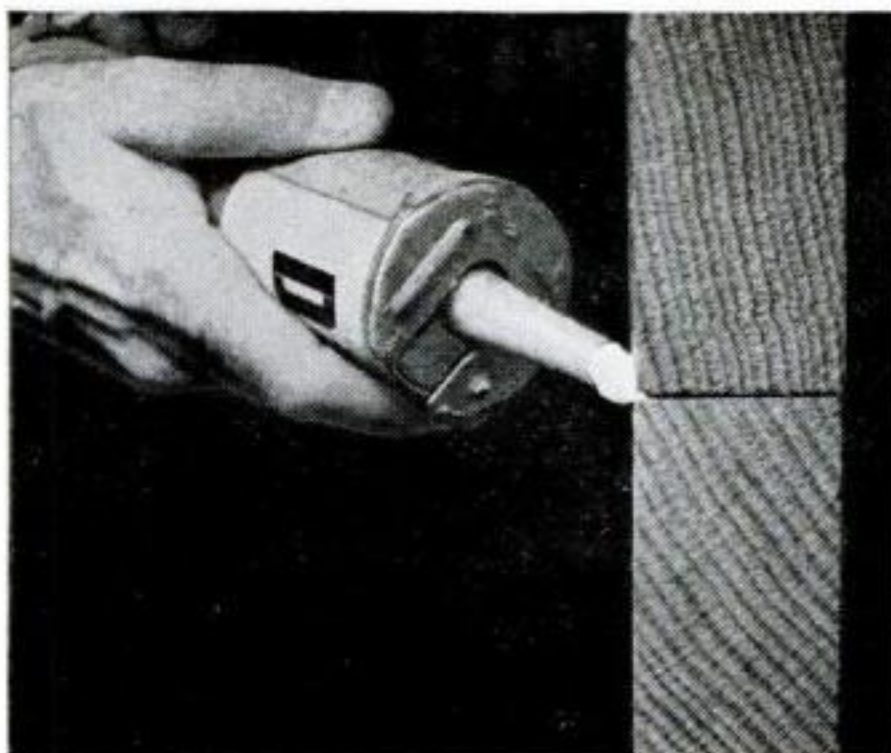
Gun-grade calking will handle most jobs. It can be bought in cartridges, or in cans for hand loading.

The can type is cheapest, but you must invest several dollars in a gun. To keep the price low and make loading easy, it's best to buy it by the gallon. To load the gun, take off the cap, push the end of the barrel into the compound and draw back the plunger.

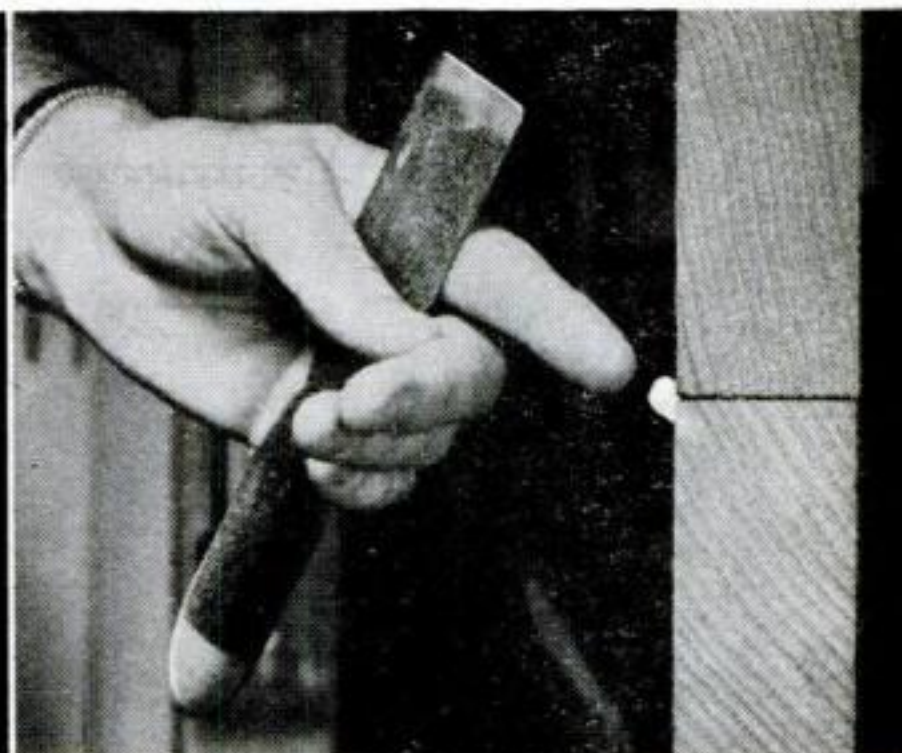
Bulk compound, usually gray, can be tinted to match the house color, making a neater job. This is not as important as it sounds, as calking should be painted anyway to keep it from drying out. There's also a bright aluminum color for calking around metal.

Using cartridges saves time and cuts your initial investment. You buy a single small container at a time, and there's no

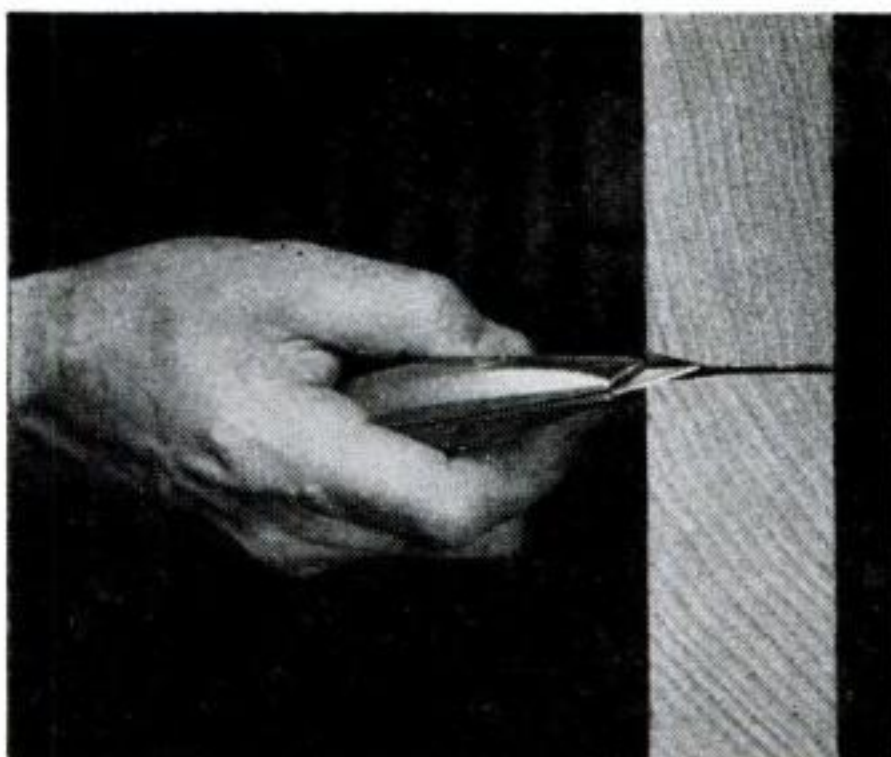
How to calk thin, deep cracks for a permanent seal



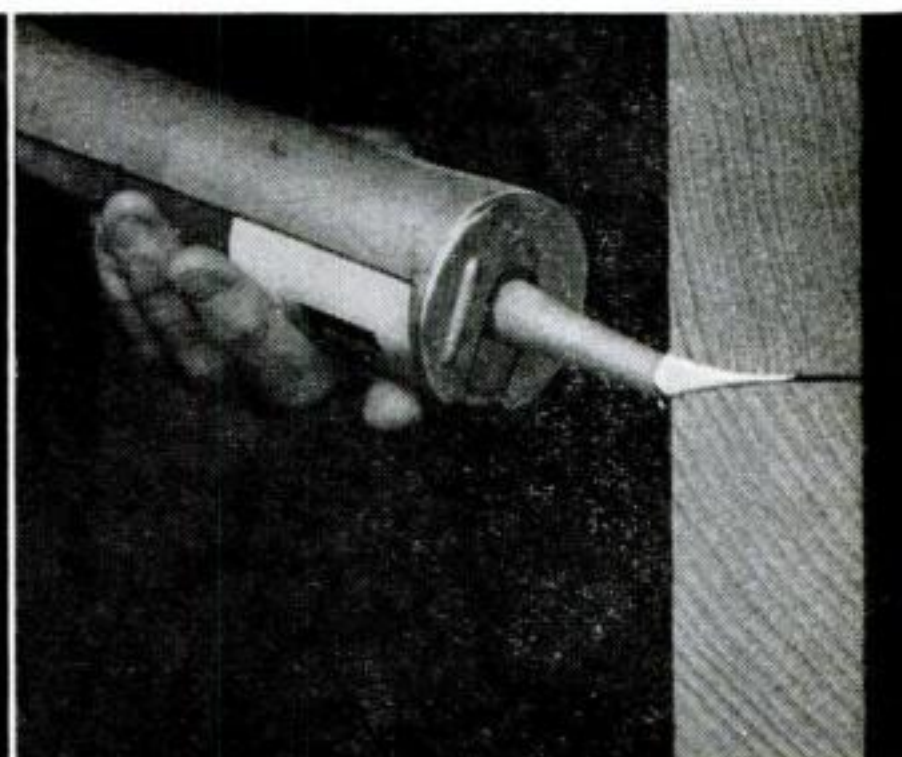
WRONG WAY: Compound applied (left) over a thin crack stays on the surface, penetrates only



slightly. If calking or wood shrinks, a ledge is formed (right) to funnel water into crack.



RIGHT WAY: Widen the crack with a knife or chisel (left) to form a deep V. Then force calk-



ing well in, leaving some excess at the surface of the crack. This joint will remain tight.

loading or cleaning mess. Cartridge calking comes in shades of white and gray.

Caliking also comes in dispenser tubes, like toothpaste, for small jobs. A key helps you squeeze it out.

Specialties for special jobs. Black caliking for roofwork is basically plastic asphalt cement, sometimes with asbestos fibers added. It comes in cans and in cartridges. Use it around flashing or vent pipes, for sticking down shingles, and for patching small damage.

To make an especially strong patch with the knife-applied type, spread a layer, press heavy cloth into it, and spread a second layer over the cloth. Dealers often stock asphalt-saturated cloth for such patches. Use black caliking

only where its color won't matter. You can't paint over it—it bleeds right through the paint.

Cord-type caliking, about as thick as clothesline, comes in rolls ready to use. Simply press it into a wide crack with your fingers. Less messy than paste caliking, it is good for temporary or one-season jobs. It can, however, be shaped and inserted permanently.

Though technically not a caliking compound, epoxy-resin mending material can be used to seal small areas. Mixed with its own catalyst, it can be worked into cracks with a paddle, sets in minutes, and becomes impervious to just about everything, including anything the weather can send you.

Cleaning

A de-sooting job now can add to

IF YOU heat with oil or coal, you can pay a high price for soot. It can cut the efficiency of your furnace by as much as half (see table). In the days of cheap fuel, our ancestors hired the chimney sweep to improve heating. Today, with soaring fuel costs, de-sooting pays off both in warm rooms and cold cash.

De-sooting your furnace is a dirty job, but it's not difficult. Do it now, before the cold winds blow, and you'll have a smoothly running heating plant all winter.

Soot is present in even the best of furnaces because combustion is never complete. Sooty smoke settles on the heat-exchanging surfaces and builds up layers of insulation that keep the heat from getting through to the air or water that warms your home. A furnace that operates at only 50-percent efficiency must be run twice as long to produce the same amount of heat.

Soot is a hazard, too. It can cause fires in your chimney that may spread to the house. And it can so foul up your stack control that the switch may fail to shut down your furnace in an emergency.

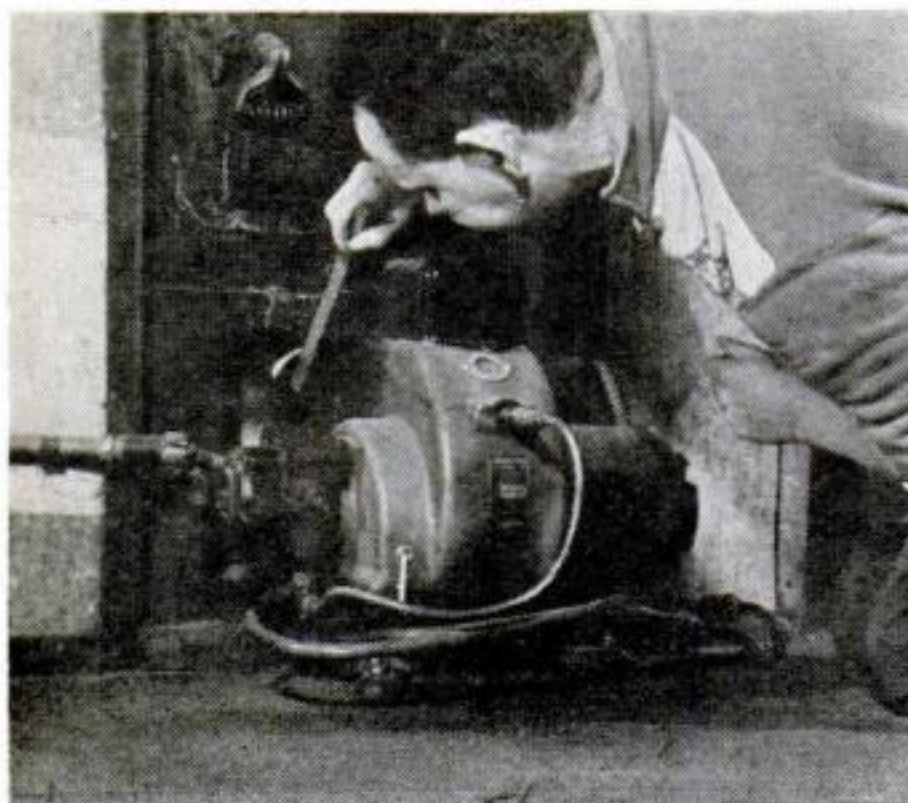
Before you start the job, let the fur-



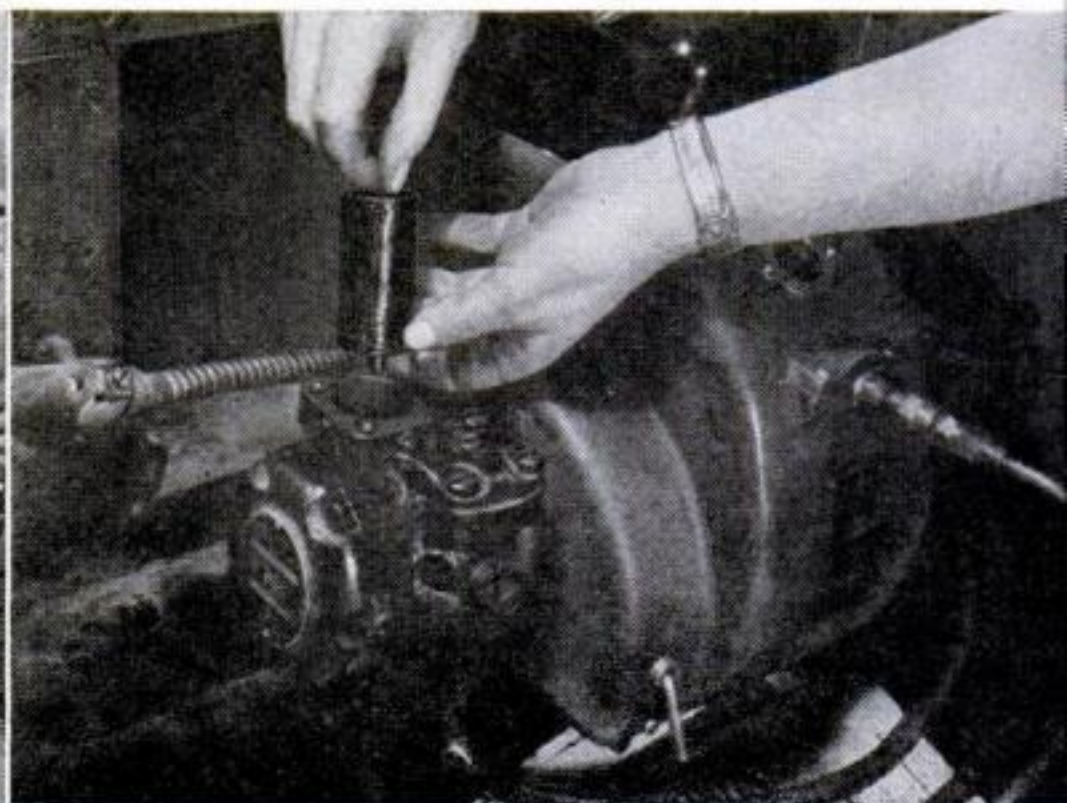
GOBS OF SOOT like this steal heat, are a fire hazard. Tap metal flue pipes sharply with a stick to loosen the soot; scoop it out through the damper opening or clean-out door.

nace cool down for several hours. And for safety, switch it off—so it can't start up while you're working on it.

Scrape the furnace walls. You can reach the heat-exchanging surfaces above



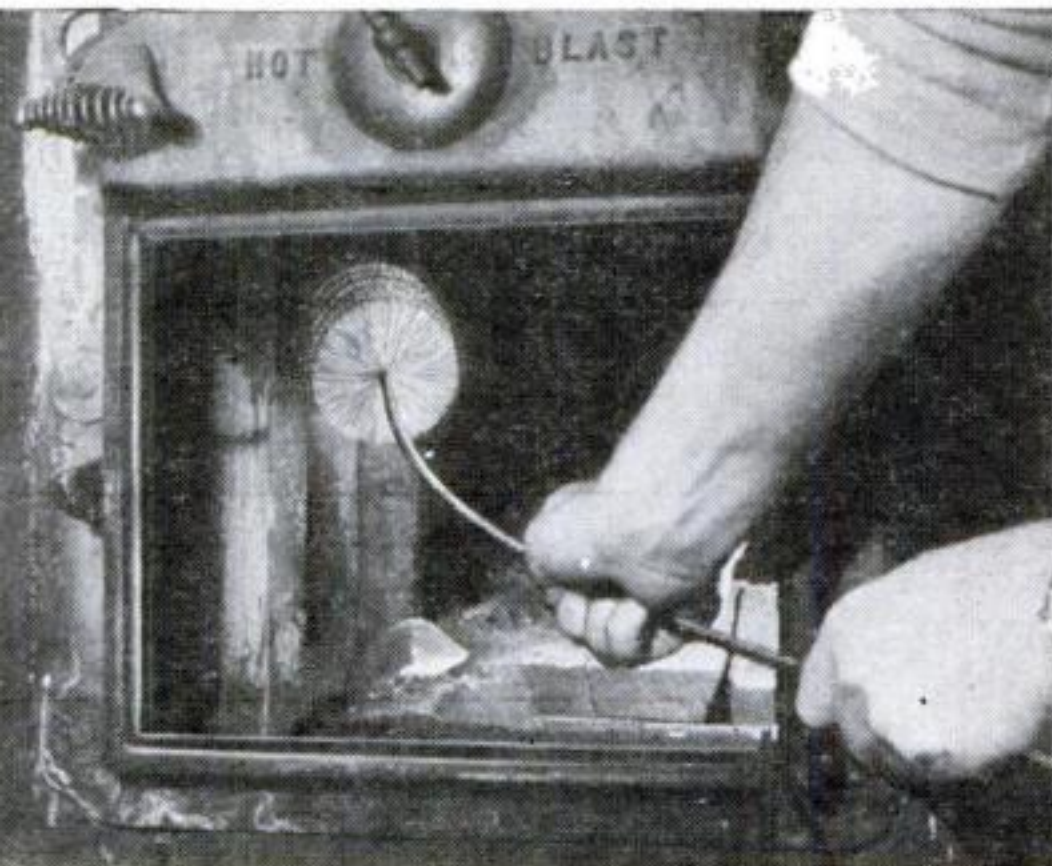
LOOSE JOINT around the blast tube of an oil burner allows cold air to be sucked in, which reduces combustion and causes soot. Seal any cracks with refractory furnace cement.



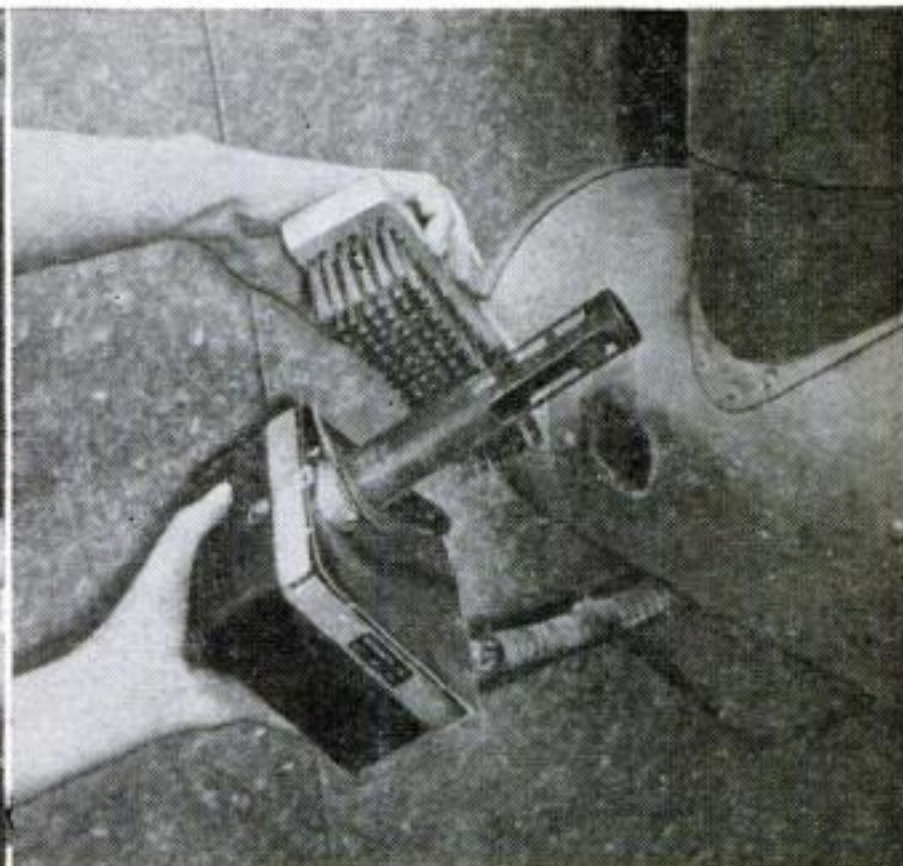
DIRTY OIL FILTER feeds sludge to the burner, causing a sooty flame. Clean the filter—found in the pump, as here, or in the line—and the burner nozzle with carburetor cleaner.

Chimney Flues

your comfort and safety—and slash fuel bills, too



SCRAPE FURNACE WALLS on the inside with a long-handled wire brush to dislodge soot. It's not necessary to remove the particles—they fall to the bottom and will be burned away.

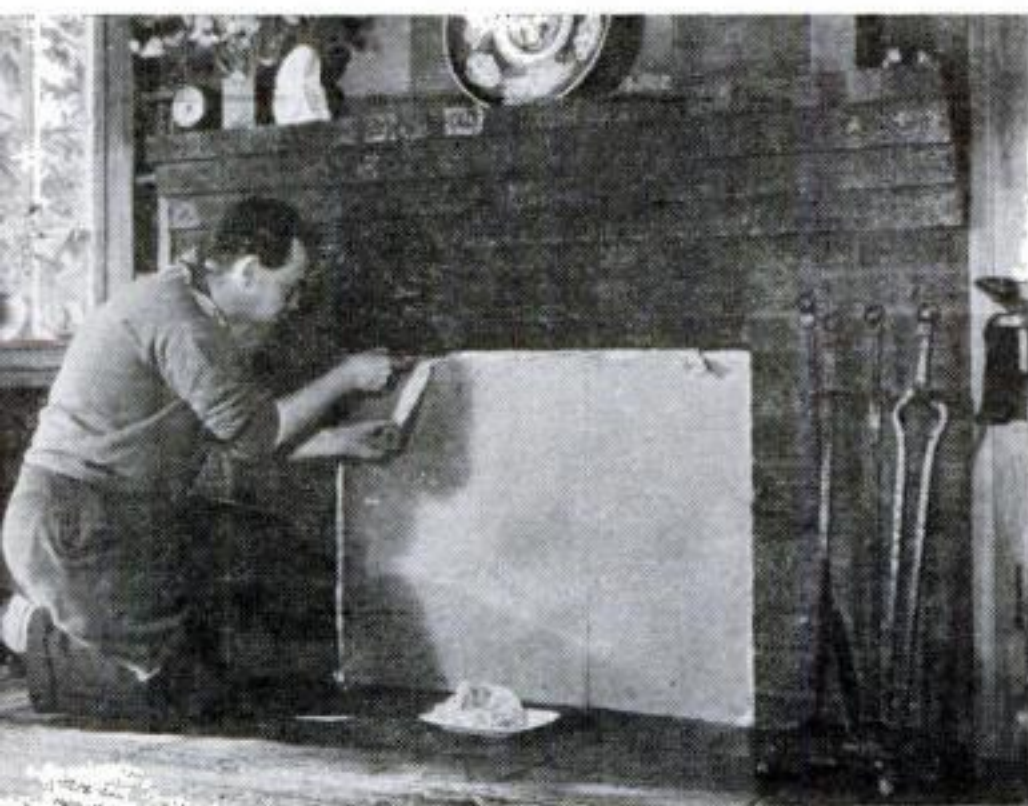


REMOVE THE STACK CONTROL from the side of the flue and wire-brush the tube. Then dip an old toothbrush in solvent and very carefully clean the bimetal strips inside the tube.

the combustion chamber with a long-handled wire brush poked through the door at the front. Scrape off the black scale down to bare metal.

To clean the metal stack outside the

furnace, rap the sides of the pipes smartly with a stick. The soot will break loose and fall to the bottom where you can scoop it out through the clean-out door or damper opening.



CLEAN OUT THE CHIMNEY with a bag of gravel on a line dropped from the top. Move the bag up and down and sideways so it rubs the walls, dislodging the soot. Seal up open fireplaces



first as above, at left, to keep the soot from blowing out. Tack cardboard to a light wood frame and wedge it tightly into the opening with strips of wet cloth around the edges.

CONTINUED

151

The stack switch needs delicate handling. The bimetal element that extends into the stack must be slipped out carefully, and the strips gently cleaned with a soft brush and solvent. Never use a wire brush on them.

Clean the chimney, too. This needn't be done as often as the furnace—every five to six years will do. Easiest way to inspect the chimney is to angle a mirror beneath it so you can see upward.

If you spot thick, black, rough-looking deposits, it's time for a cleaning. Besides being a fire hazard, the scale acts as insulation. The extra heat normally given off to the house on the way up the chimney keeps right on going out the top. Heavy soot deposits can also reduce the flue opening enough to cut down the draft, which causes a dirty fire—which causes more soot deposits.

You can make your own chimney sweeper from a burlap bag partly filled with gravel. Tie the bag to a rope and lower it down the chimney so that it rubs against the walls, knocking the soot loose. If the scale is very stubborn, it can be chipped off with a log studded with nails, raised and lowered like the bag.



CHECK WARM-AIR REGISTERS: If you find soot on the insides, it may be a tip-off to leaks in the furnace that let smoke enter the air supply. Have a serviceman check the furnace.

Chemical soot removers. These do a fair job, but are no substitute for a thorough cleaning by hand. They're useful on furnaces where heat-exchanging surfaces are hard to reach with a brush.

There are a number on the market. One kind, for oil-fired furnaces, is added to the fuel tank and works in much the same way as additives sold for cleaning

carbon deposits from auto engines. Another kind, for coal- or wood-burning furnaces, is a powder you sprinkle on top of the fire.

When using the oil additive, pour the chemical into your fuel tank just before the truck comes to fill it. This insures thorough mixing with the oil. The powder stuff raises the temperature inside the furnace. If you use it on a furnace of the automatic type with a bimetal control, remove the control temporarily to prevent damage from excessive

heat. Seal the hole left by the control by wiring on a scrap of sheet metal.

Stop excess soot. Some soot is inevitable; a lot isn't. You can keep it to a minimum by making sure that your furnace is properly adjusted.

The likeliest cause of soot is a poorly regulated air supply that produces a smoky fire. Introduce just enough air to make the fire burn cleanly, but no more—too much air blows heat out the chimney.

The air control on oil burners is usually a sliding collar that covers slotted openings in the burner housing. By loosening the collar and moving it to one side or the other, you open or close the slots to let in more, or less, air. Take care to make the adjustments slowly and gradually. A too-sudden or extreme movement of the collar may throw combustion out of whack and give you confusing results.

Other causes of soot are air leaks around an oil-burner blast tube, a dirty oil filter, and a clogged burner nozzle. Cleaning the filter and sealing up leaks are jobs you can do yourself. If you don't wish to remove the burner to clean the nozzle, it's worth having a serviceman do it after other trouble spots have been checked.

How Soot Can Cost You Heat

AMOUNT OF SOOT	HEAT LOSS*
1/32" thick	9%
1/16" thick	26%
1/8" thick	45%
3/16" thick	69%
*Based on 100% efficiency of a clean surface.	



Short Cuts and Tips

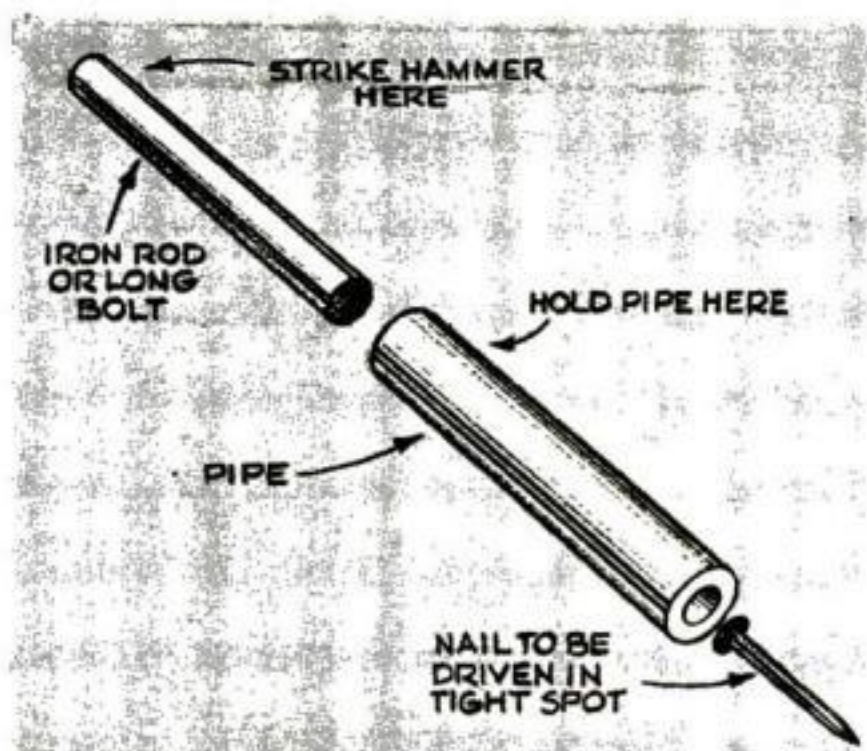
FROM PS READERS

Ship Canal from an Old Tire

CUT a discarded tire in half along the tread center with a keyhole or compass saw to make an endless canal for your youngster's boats. Putty any nailholes below the water line.—*John J. Bahr, Ithaca, N.Y.*

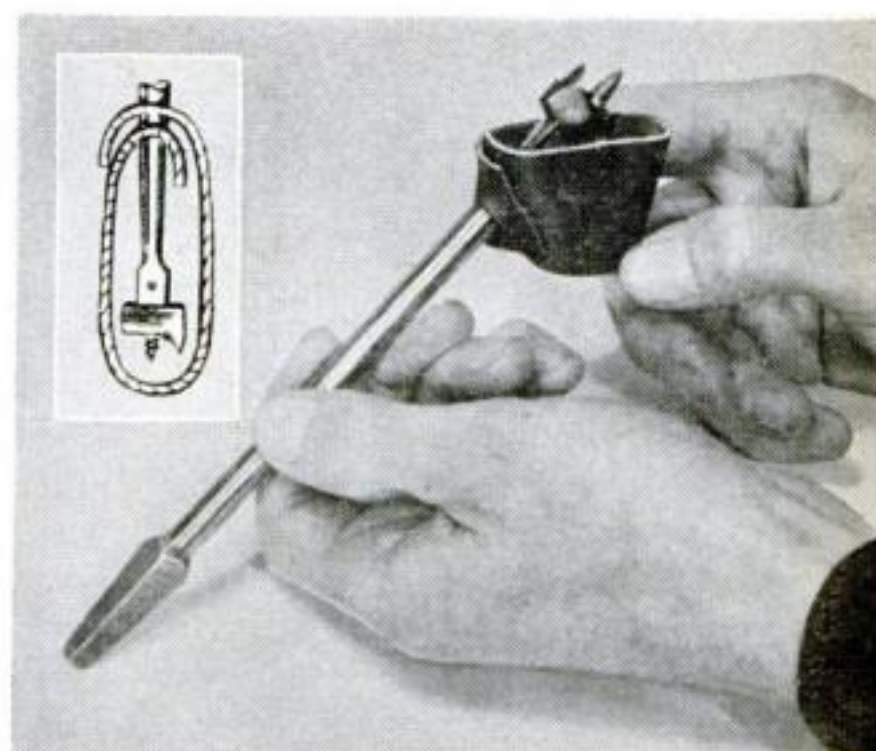
▶▶▶MY VALUABLE old barleycorn bottle was ideal for a den lamp, but was such an odd shape I couldn't drill it in any of the usual ways. I took it to the local garage and asked to use the plug-cleaning machine. With the bottom of the bottle held tight against the blast gasket, the abrasive compound cut through the glass, leaving a smoothly tapered hole for the wire.—*R. B. Ryan, Torrance, Calif.*

▶▶▶AFTER you've welded a protective layer of stainless steel over mild steel, you may want to grind it down to a smooth surface. To be sure you aren't removing the overlay you just applied, check by coating the smoothed surface with copper sulphate (CuSO_4). Any mild steel you've exposed will discolor or "blush." Stainless won't.—*Lloyd McWilliams, Shawinigan South, Que.*



Improvised Nailing Gun

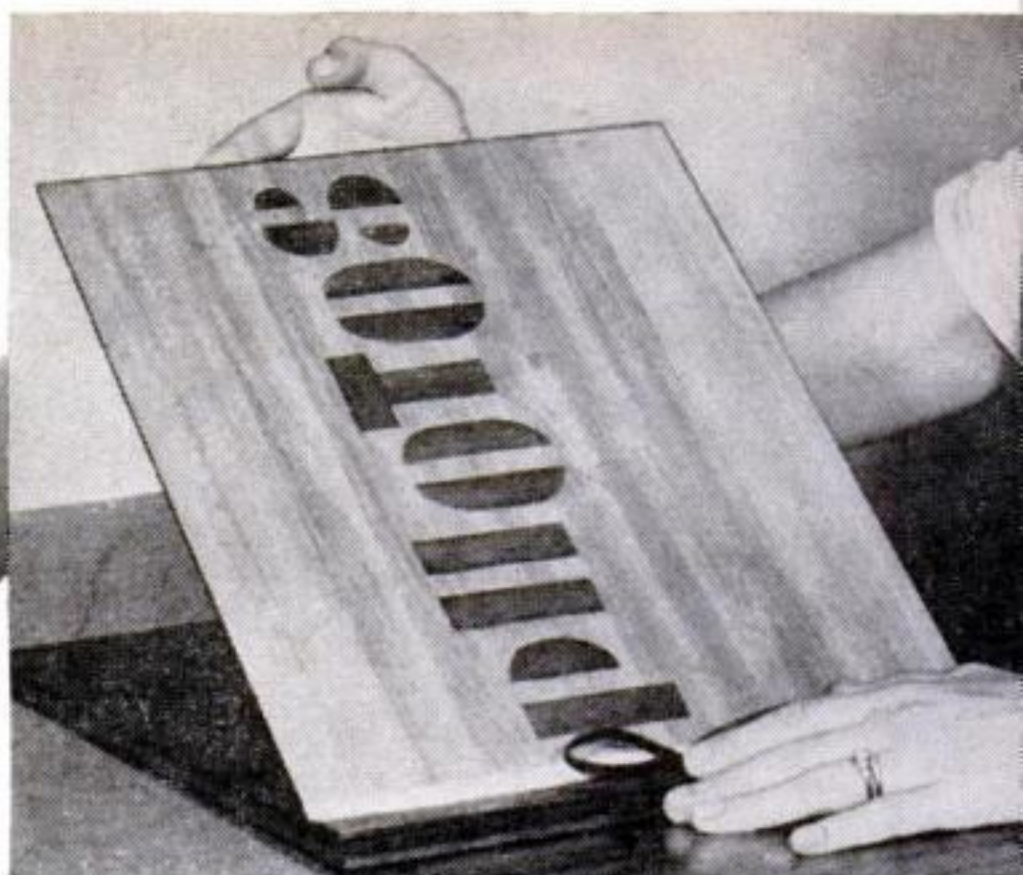
THERE'S almost no spot too tight for this simple nailing tool. Measure the distance from the clear area (where you can swing a hammer) to the spot where you must drive the nail. Cut a piece of pipe enough longer than this to provide a hand grip at the top. Find a piece of rod that will just slip inside the pipe. Insert the nail at the opposite end and drive it by striking the rod.—*Charles Andres, Port Sulphur, La.*



Guard for Expansive Bit

A STRIP from an old inner tube will protect your expansive bit from damage in the tool box. Cut the strip wide enough to cover the extended blade. Overlap the ends of the strip and punch a hole through the two lapped ends. Slip the square end of the shank through the holes and then pull the loop over the blade. To use the bit, pull the guard to one side and up the shaft—but leave it attached.—*R. Hanscom, Elmhurst, Ill.*

Extra Jobs for Wood Tape



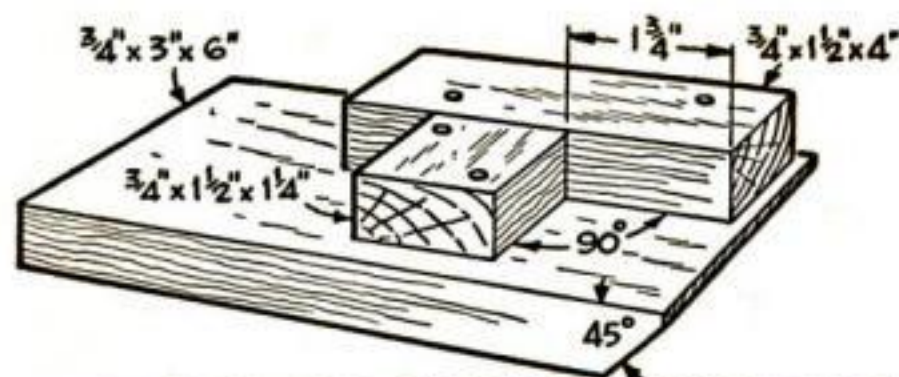
By Edwin M. Love

YOU'RE missing something if you reach for veneer tape only when you've got the edges of a plywood panel to finish off. This versatile material can be used in many imaginative ways, opening up woodworking fields that you may have shied away from.

Inlaying, for instance. Try it with tape. The kind called Flexible Wood-Trim comes in coiled strips 1" wide and 8' or 16' long, and in different woods that permit many striking combinations.

Here are two sample projects. Both call for a backing of $\frac{1}{8}$ " tempered hardboard cut $\frac{1}{8}$ " longer and wider than the pattern to allow for fitting the strips together. Tools required are scissors and a brush for the white polyvinyl glue. Dunk the brush in water after each use.

Gameboard. Scribe center lines on the hardboard and lay out the squares. Each requires two strips and you'll save time if you make the cutting jig, below. Apply the first strip to a square at the center of the layout, lining up an edge and an end with the center lines. Rub flat and add



CUTTING JIG FOR CHECKERBOARD STRIPS

the second strip, keeping the center-line end even with that of the first strip while closing the edge joint. Assemble the other three center squares and trim the outer edges with a chisel, as shown below, right. Lift the waste from the board and scrape off the surplus glue before removing the straightedge.

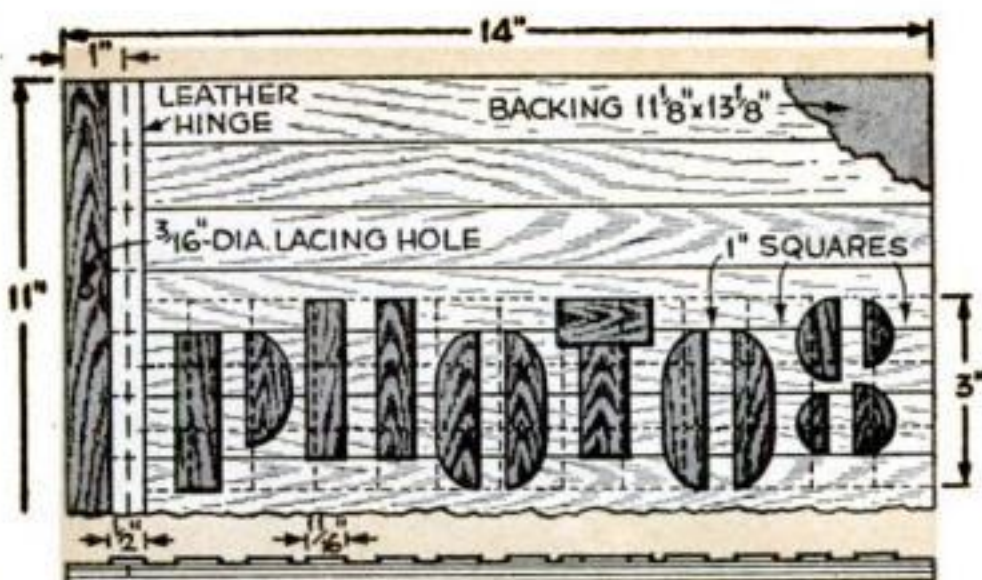
Against this core of four squares, build the surrounding rows, trimming each. When the playing area is complete, miter and apply border strips. You'll have to trim the tape for the narrower ones.

Photo album. The back is one piece of hardboard but the front cover is cut 1" shorter and filled out with a binding

Inlaying is a cut-and-paste job,



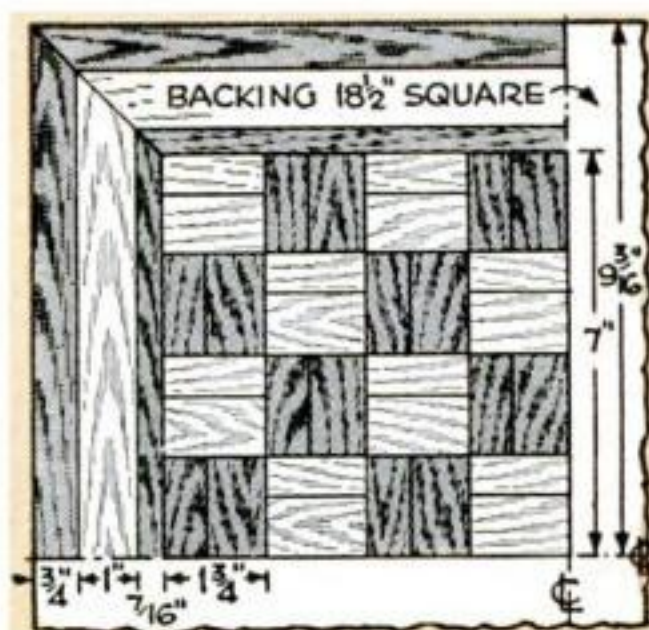
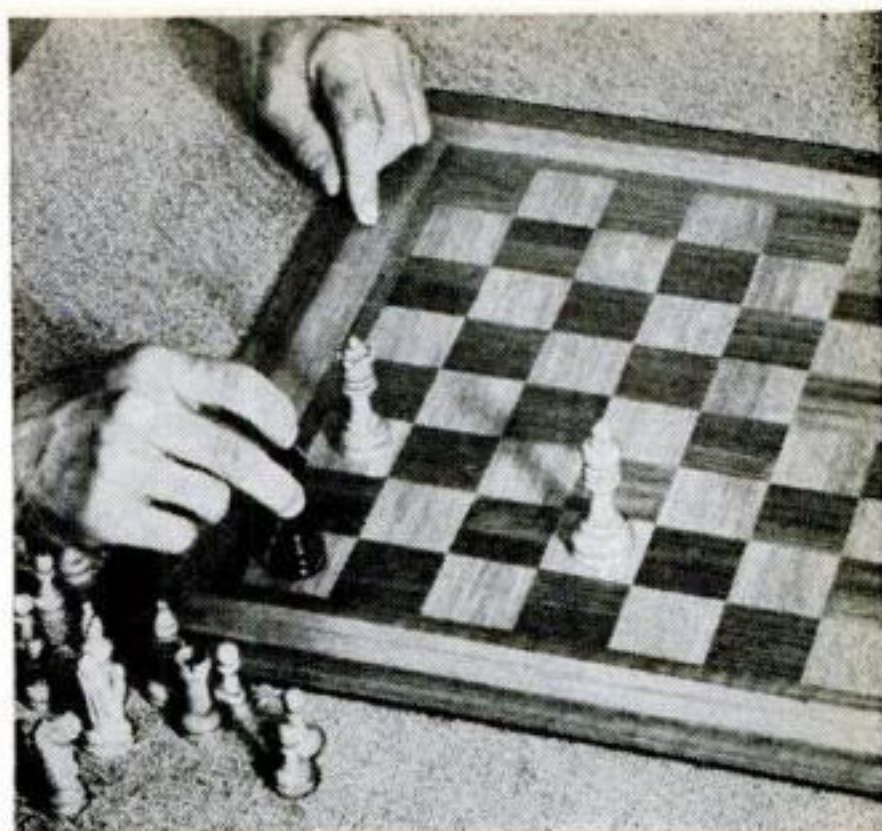
JIG SPEEDS CUTTING of strips for the checkerboard squares. Nail three pieces of scrap together, as shown in the sketch at left, to provide a square corner for end of tape. Keep the lower blade of the scissors flat against the forward edge of the jig to assure a 90-degree cut.



VENEERED ALBUM COVER has decorative overlay of letters cut from darker tape. Position these by making full-size pattern on graph squares and transferring this onto the background.

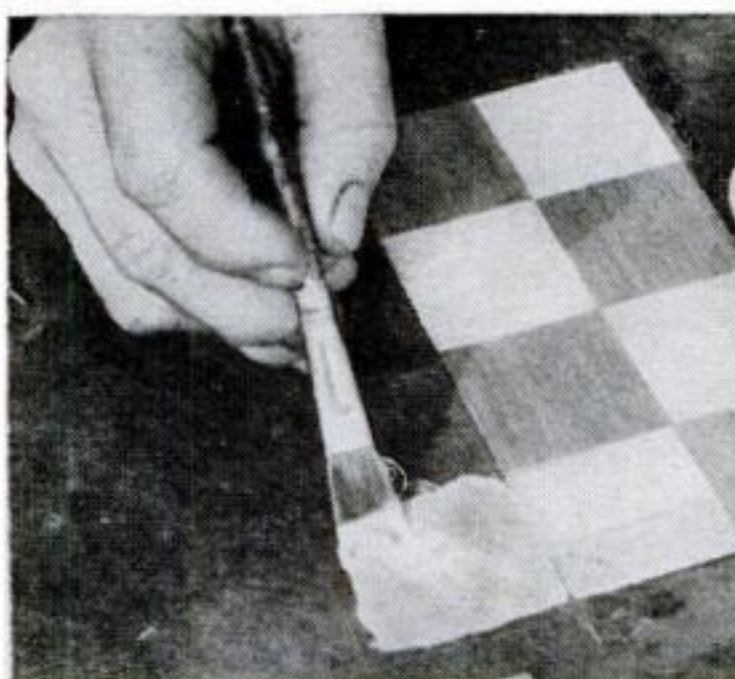
strip drilled to take a lace passed through the perforations in the filler pages. Scribe a center line and work in both directions from it when applying the tape strips.

The overlay letters are 2 1/2 inches tall and are cut from darker tape trimmed to a width of 1 1/16 inches. Make four cardboard templates for the curved parts: half an O and the curved P and S segments. To position the letters, make a full-size layout on 1 inch graph paper and transfer this to the background veneer. Attach the finished cover to the binding strip with a strap of kid leather centered over the joint. Cut the strap wider than 1/2 inch and trim the edges straight after it's glued on.

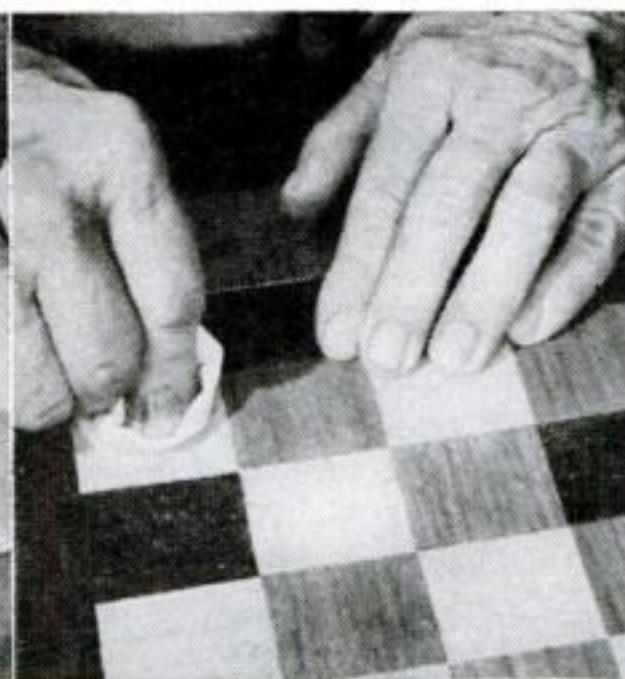


INLAID GAMEBOARD for chess or checkers is easy to lay out on hardboard backing. One quarter is shown here. Birch and walnut squares provide a good contrast.

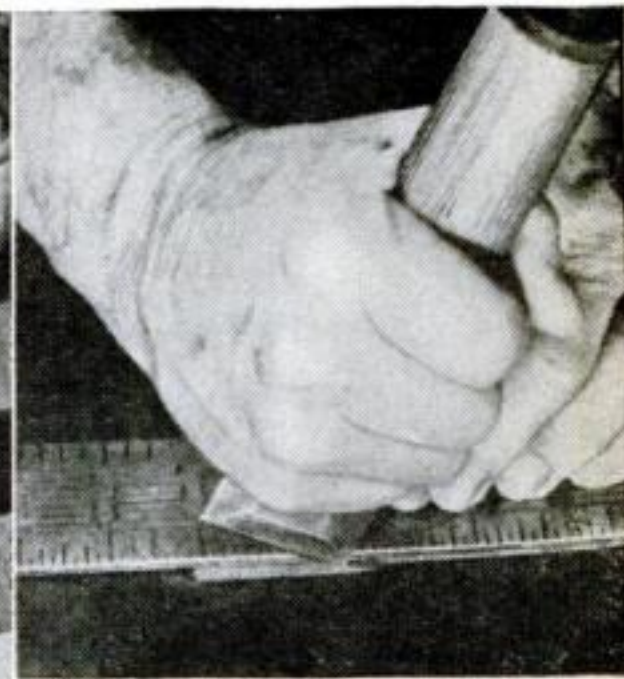
yet the effect is entirely professional



APPLY WHITE GLUE with a soft 1/2 inch brush after moistening the hardboard backing and wiping with a cloth. When surface is tacky, press strips in place. Work only one square at a time.



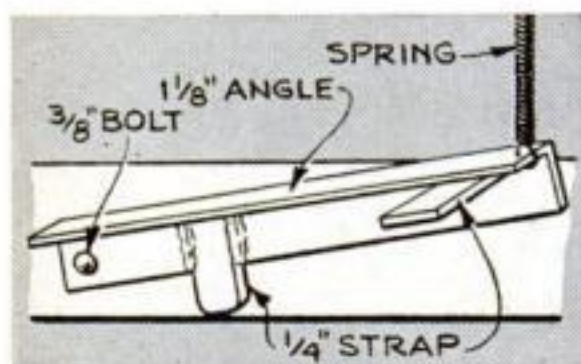
RUB COMPLETED SQUARE with a cloth to work out air bubbles and excess glue. Wipe away glue beads that appear at joints and scrape off excess squeezed out around the edges.



TRIM SQUARES by drawing the corner of a sharp chisel along the edge of a steel square clamped to the face of the work. It's usually best to cut veneer pieces a bit oversize.

Short Cuts and Tips

FROM PS READERS

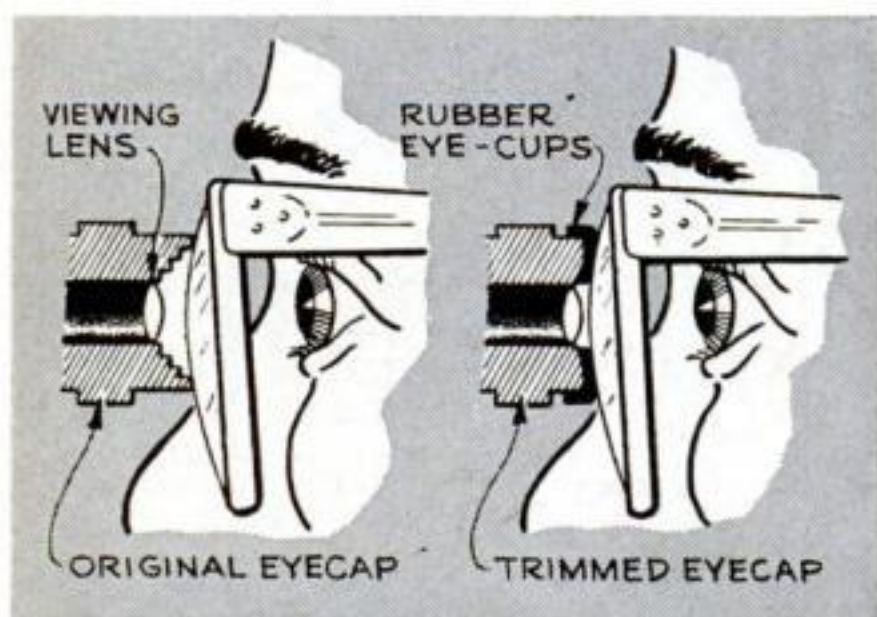


Loosening a Stuck Garage Door

MANY overhead garage doors stick at the bottom, especially if they freeze shut in winter. Stepping on this foot lever will jack up the door and let you open it easily. It's made by welding two short pieces of $\frac{1}{4}$ " strap iron—one for a foot pedal, one for a fulcrum—to a 14" length

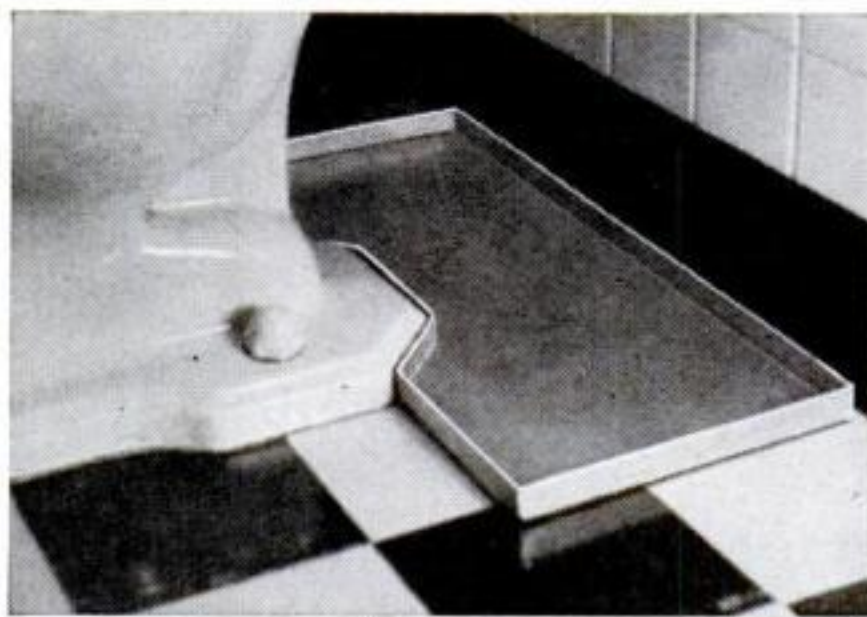


of angle iron. A spring holds the pivoted lever out of the way when it's not in use.—James Rouse, Danville, Ill.



Adapt Binoculars to Eyeglasses

Most binoculars are awkward for people who wear glasses. Projecting flanges on the eyecaps butt against the spectacles and keep the eyes too far from the binoculars for an adequate field of vision and proper focus. As a Park Ranger, I found it a bother to remove my glasses each time I had to use my 7x50 binoculars; by trimming off the flanges, I increased the viewing area, when wearing glasses, by about 50 percent. Plastic eyecaps can be removed and hacksawed, filed, or ground down to the shape shown. To avoid scratching spectacles and to keep out stray light, slip on a pair of soft-rubber eye-cups, available in camera stores.—Robert C. Stevens, Zion National Park, Utah.



Drip Pan for Flush Tank

BATHROOM condensation causes our toilet tank to sweat badly. We cut a cardboard template to fit behind the toilet and added a $\frac{3}{4}$ " flange when we transferred this pattern to sheet aluminum. After cutting and bending, we sealed the corners with metal putty.—William Horrell, Louisville, Ky.

▶▶▶HEAT can't warp my slides and make them pop out of focus any more. I found that normal slide ventilation was obstructed by the adaptor for my automatic changer. Drilling six $\frac{1}{4}$ " holes in both the top and bottom of the adaptor restored regular ventilation.—Dr. George Kafig, Silver Spring, Md.

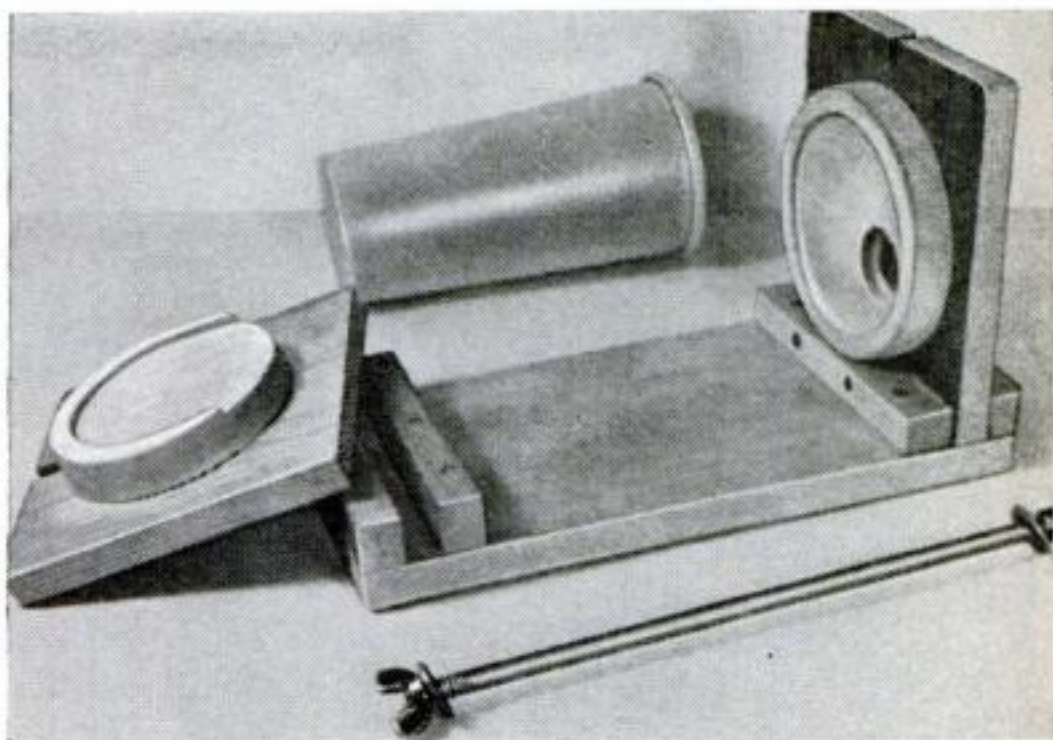
... Lathe Tumbler Speeds Finishing

YOU can give small stampings, castings, or machined parts a professional-looking finish with this homemade tumbler for your lathe. Stampings and machined parts can be de-burred, sharp edges knocked off, and surfaces given either a polished or matte finish. Imbedded sand can be cleaned from castings and fins, or other surface roughnesses smoothed.

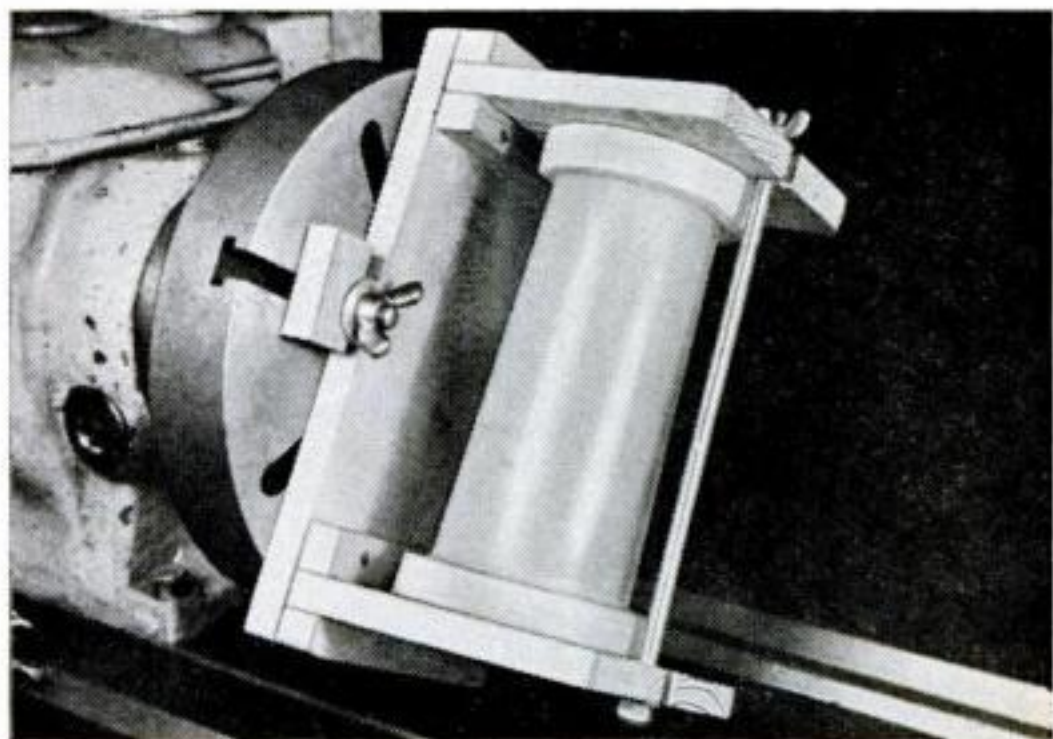
The tumbler barrel is an ordinary quart-size plastic shaker for powdered milk. It is supported in the lathe by a simple wooden frame clamped to the faceplate. The shaker nests in circular turned seats between the end supports, secured by a single tie rod with wingnut that clamps it tightly in place.

Techniques for using the tumbler will vary with the type of work and finish desired. Put the parts and abrasive in the shaker—don't overfill, about $\frac{2}{3}$ full is good—and run the lathe at fairly low speed, not over 200 r.p.m. Pellets specially made for the purpose are available from abrasives manufacturers. They come in various sizes and shapes to suit different jobs and finishes.

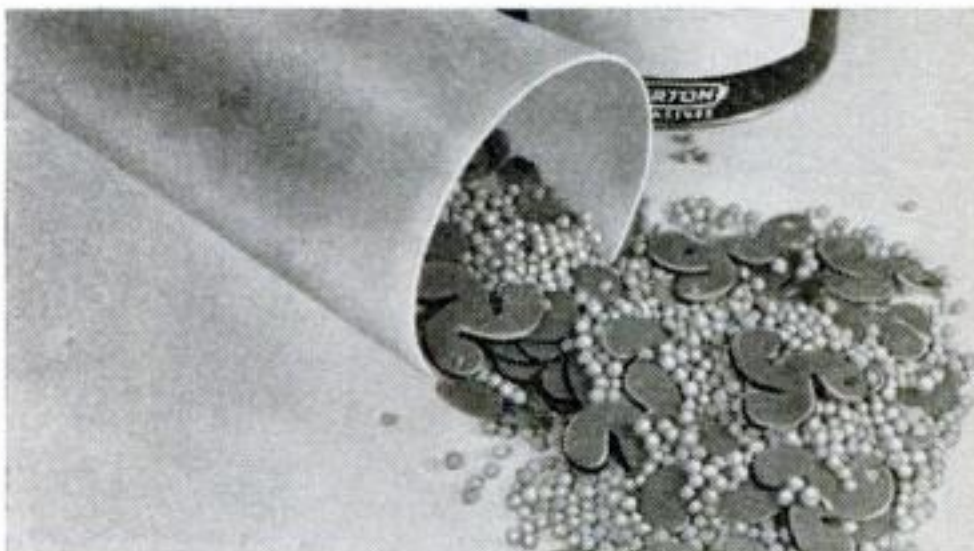
Use a fine abrasive for polishing, and experiment with the addition of a cushioning material such as sawdust, or water mixed with a detergent.—H. J. Gerber, Stillwater, Okla.



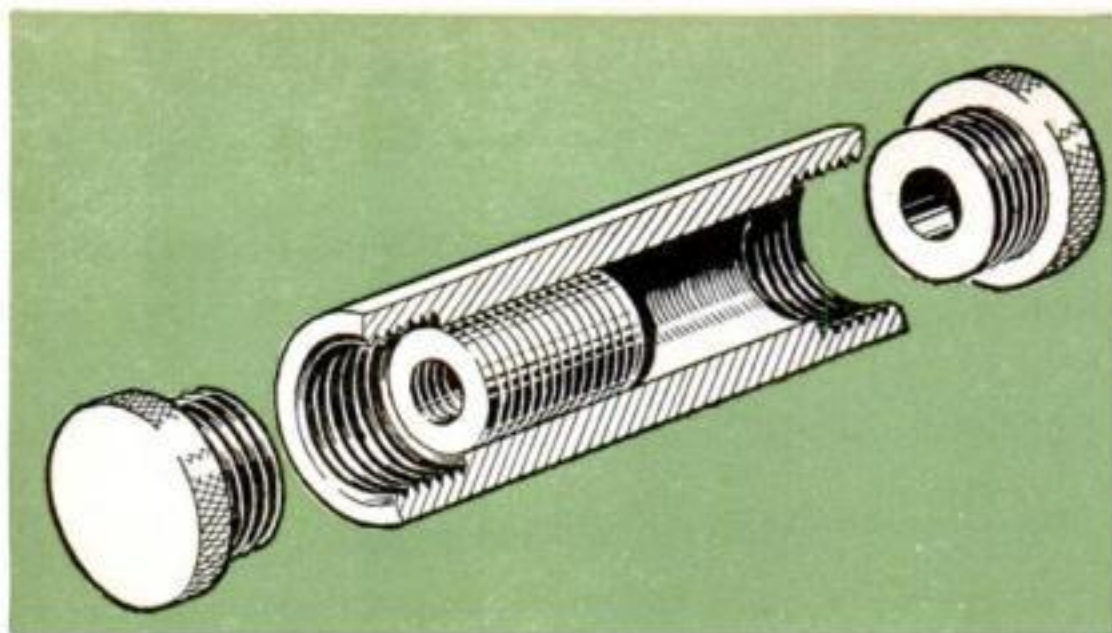
TUMBLER FRAME is made in three pieces: a backboard with two pairs of cleats, and upper and lower support boards for the shaker ends. Screw upper end support to cleats, leave the lower one free for easy removal.



SNUG-FITTING RECESSES, turned in the wooden end blocks, grip the ends of the plastic shaker. A single tie rod through slots in outside edge of end supports holds the whole assembly securely when the wingnut is tightened.



ROUND ABRASIVE PELLETS were used here to de-burr small stampings. Other shaped pellets are available for different kinds of work. On a job with inside corners, for example, you might use triangular-shaped pellets.



Jig Simplifies Drilling Washers

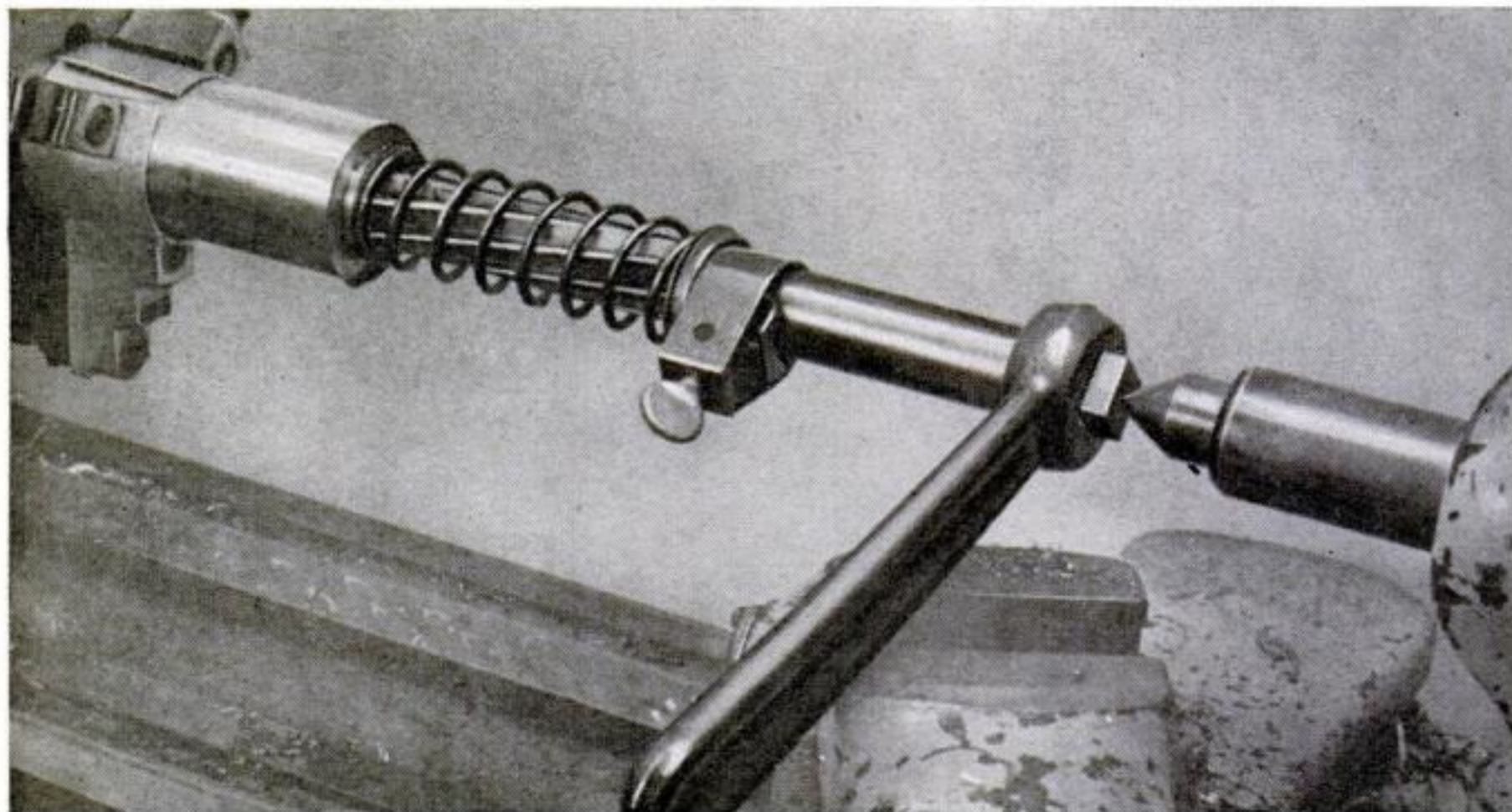
WHEN you need to enlarge the hole in fairly large quantities of washers, the job can be done rapidly on the lathe with this inexpensive jig.

Use a scrap of pipe with an i.d. that fits the o.d. of the washers. Thread the inside of each end. Make a stopper to screw in one end and use a standard drill bushing in the other. Fill the pipe with washers and screw the bushing in tight. The washers will be squeezed in a solid grip—securely held for drilling. Chuck the jig in the lathe and drill through all the washers in one operation. —*Federico Strasser, Santiago, Chile.*



How to Turn Taps in Tight Places

WHEN there's no room to turn a tap wrench, a nut pressed on the shank of the tap will let you choose any kind of wrench that will work. Use a hex nut that is a press fit on the square shank of the tap. Press it on with the jaws of a vise. Now you can use a socket, open-end, or box wrench to turn the tap. —*William Harrell, Louisville, Ky.*



Take the Risk out of Power Reaming

REAMING under power is usually risky because of the tendency of the reamer to overfeed. A broken reamer or spoiled work often results when the reamer pulls off the supporting tail center, cocks to one side, and catches in the work. This jig will prevent such accidents.

Use a compression spring that fits

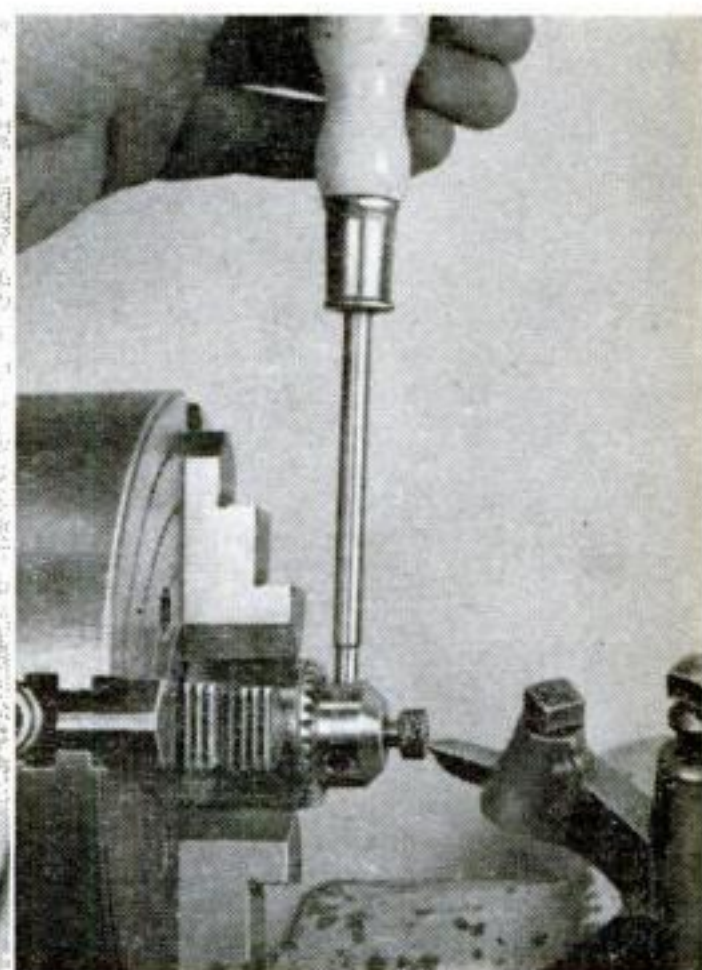
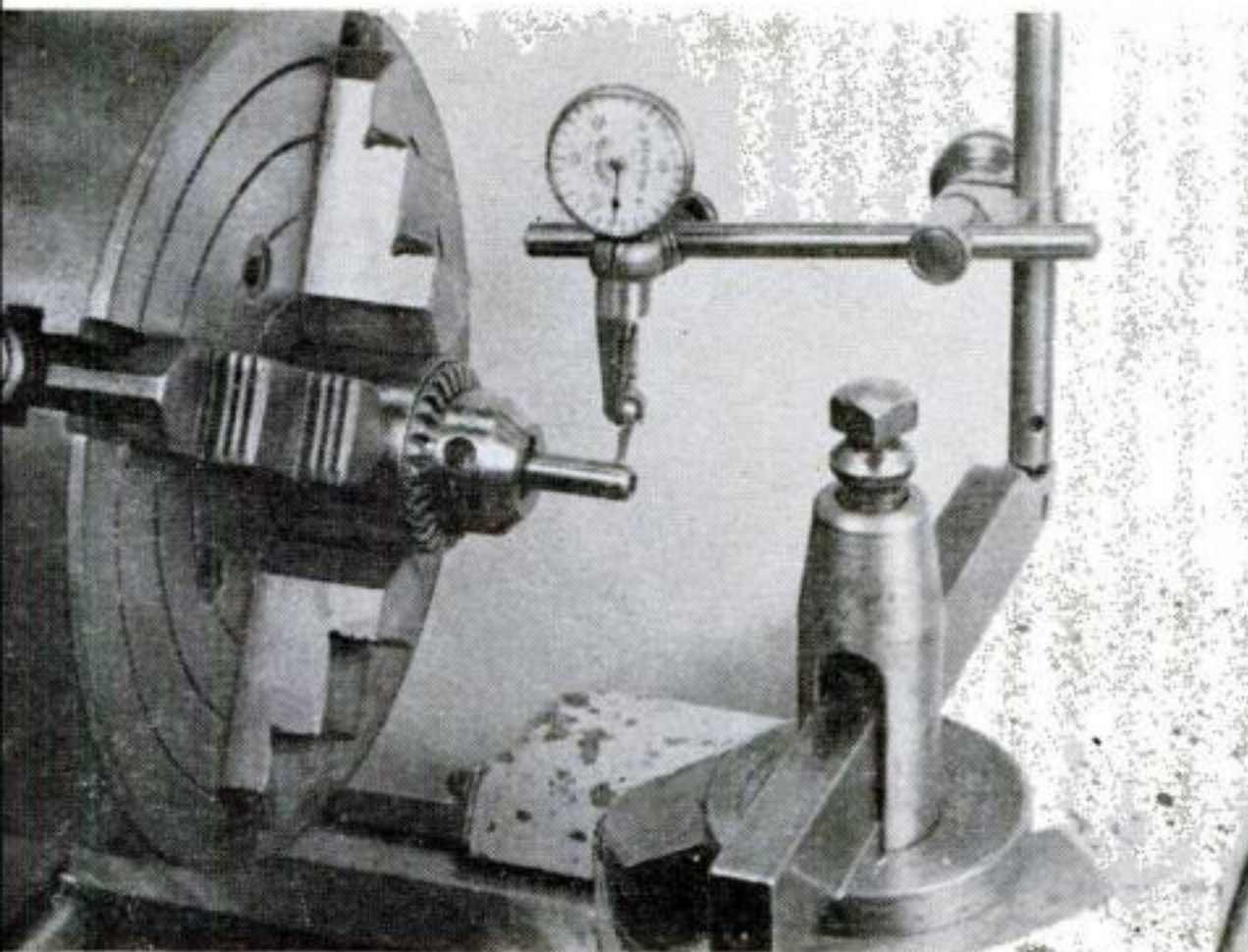
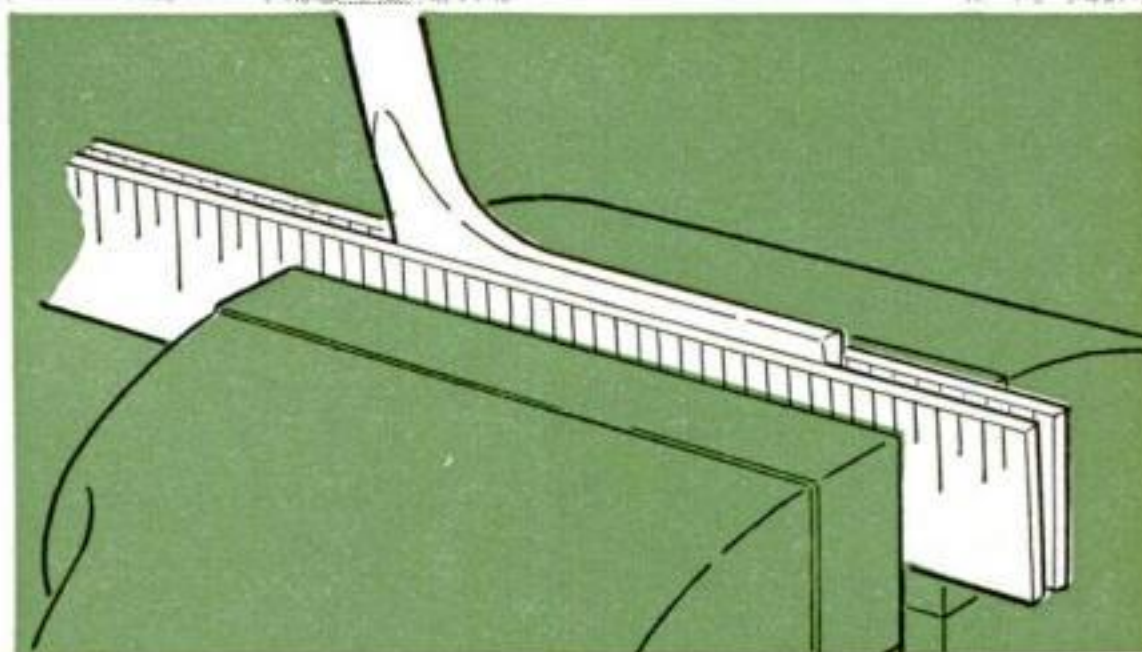
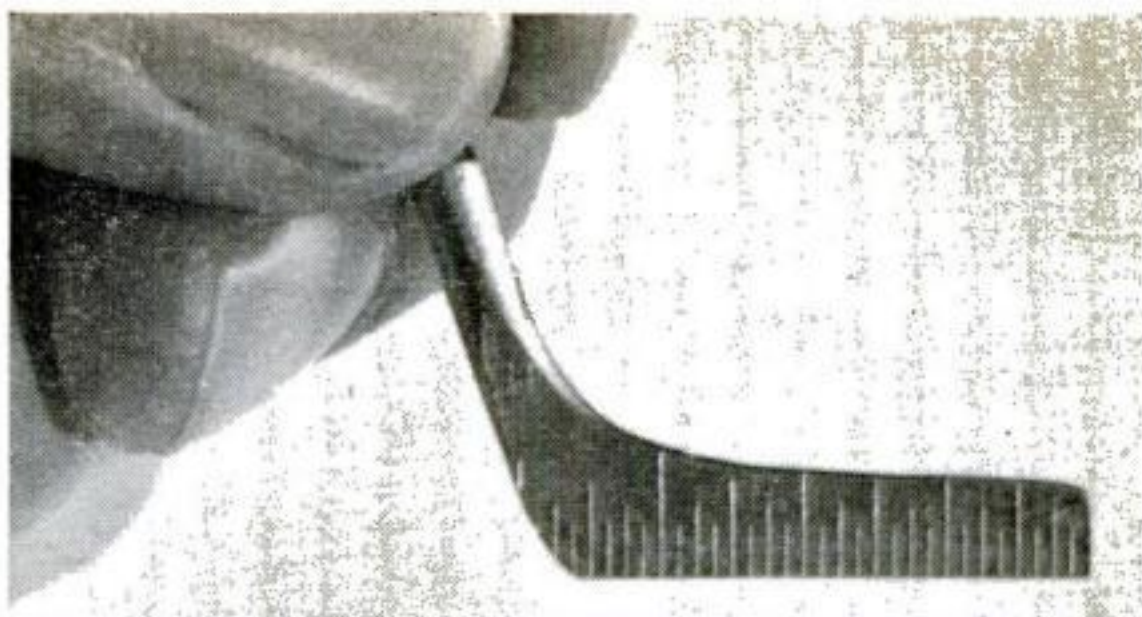
loosely over the flutes of the reamer. Lock a thumbscrew-type hose clamp on the shank of the reamer to back up the spring. Now, when the reamer is fed in with the tail spindle, the spring bears on the work's outer face and keeps the reamer seated tightly against the tail center. —*H. J. Gerber, Stillwater, Okla.*

How to "Coin" Your Own Rule

OFTEN a measurement is needed in a hard-to-get-at place where none of your metal rules will fit. You can make an accurate replica of your engraved steel rule from a piece of wire solder and shape it to fit.

Bend the solder to the approximate shape you need and flatten it slightly with a hammer. Put the flattened part between two steel rules, with the solder protruding slightly beyond the edges of the rules. Clamp this sandwich in a copper-jawed vise and tighten.

The solder will take an impression of the markings on the rule. Trim the edges and file smooth.—*H. Carhart, Ft. Lauderdale, Fla.*



Chuck Small Work with Precision

HERE'S a way to handle small-diameter work more quickly and accurately than with a conventional chuck, even if you don't have collets for your lathe. Chuck a drill chuck in any ordinary independent-jaw lathe chuck and adjust it so that it runs dead true. This is easy to do with precision: Grip a short piece of drill rod

in the small chuck and check with a dial indicator as you make adjustments on the large chuck.

Make a "quick closer" lever for the drill chuck by grinding down the sawed-off end of an old screwdriver to fit one of the keyholes in the drill chuck.—*H. J. Gerber, Stillwater, Okla.*

Boating Tips

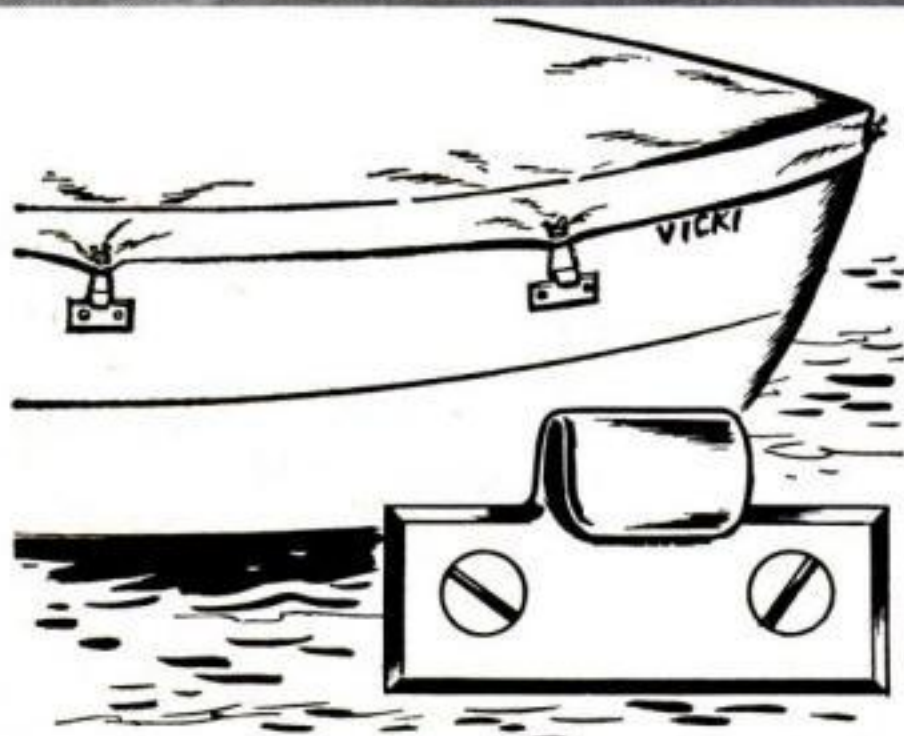
INNER-TUBE BOAT will let you fish those choice spots you can't reach from shore. Lay two slats across a used truck tube (size 11.00 x 20) and place a seat plank on top, at right angles, to form an H. Squat aboard and maneuver the boat with a paddle in each hand. It will carry more than 200 pounds safely.



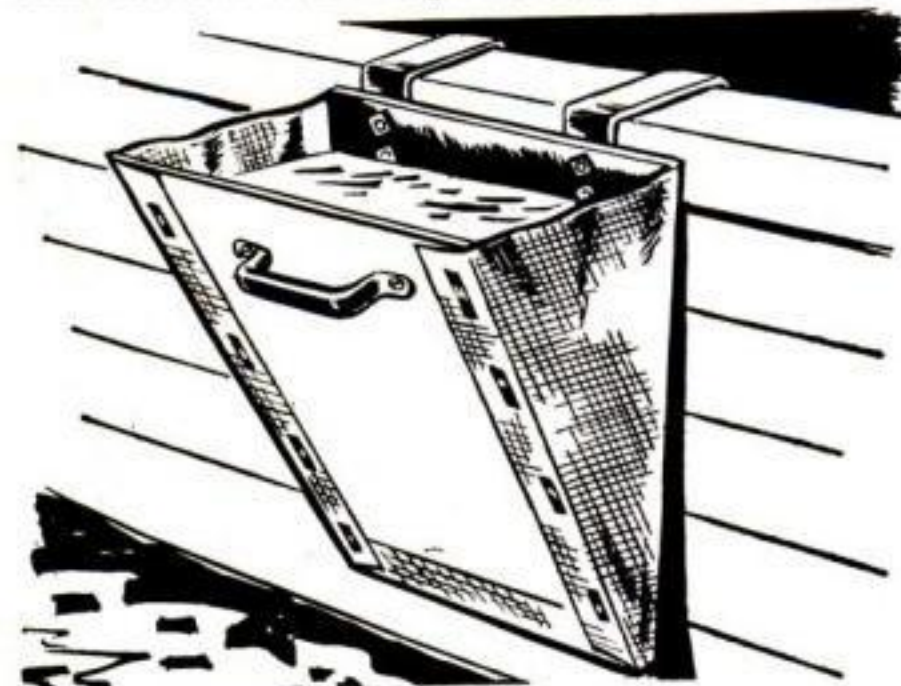
RAISE AN ANCHOR easily and neatly by means of a clothesline reel mounted on the outside of your boat. Inboard mounting is also possible if you provide a pulley for the line.



MOOR YOUR BOAT to any shore by carrying along one of the auger-type metal stakes used for leashing a dog in the yard. It will turn by hand into a sandy beach; in earth, you'll want to put a stick through the eye.



SASH LIFTS make inexpensive tie-down hooks for the cords of a boat cover. They can be obtained in brass or chrome to match the boat trim. Attach with rustproof screws or bolts.



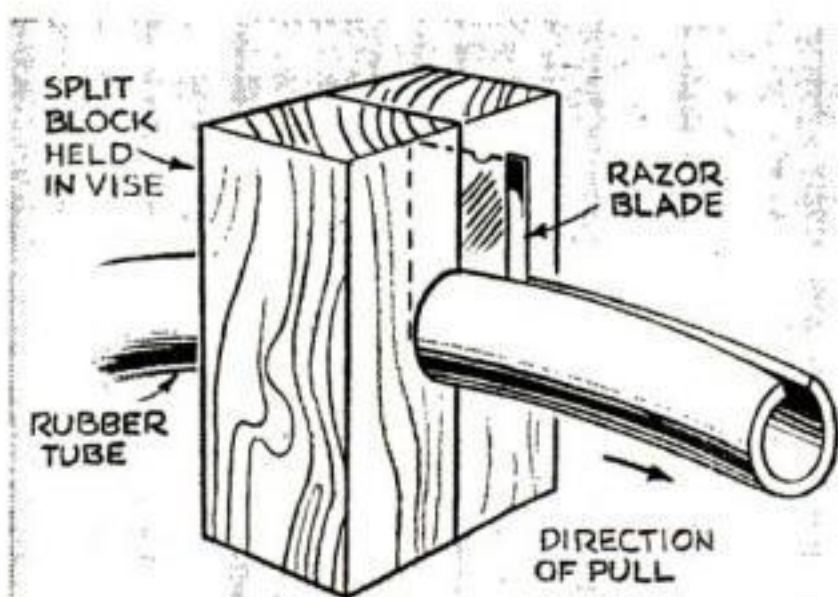
FOLDING MINNOW BUCKET hooks over the side of the boat, takes no floor space, and flattens for easy storage when emptied. Front and back are marine plywood or tempered hardboard with sash pull and aluminum-bar hooks bolted on. Join these two panels with canvas sides and bottom hinge, using waterproof glue. Evaporation through the canvas keeps the water cool.



Barrel with Litter Appeal

A DIAGONALLY cut section of one 55-gallon drum welded to the top of another makes an angled trash barrel with litter appeal. Although it takes three drums to make two angled ones, this type receptacle is used by motorists who'll drive right by conventional trash barrels.—*Arnold Gesterfield, Scottsbluff, Neb.*

▶▶▶TO DETECT invisible cracks, dip clean metal parts in kerosene containing a small amount of oil. Wipe dry and spray with a mixture of alcohol and zinc oxide. Cracks will show up as brown lines.—*Edward Bentley, Jackson, Mich.*



Slitting Rubber Tubing

RUBBER molding for sheet-metal edges can be made by slitting one side of a small-diameter rubber tube. Pull the tubing through a hole drilled in a split block holding a razor blade as shown. If it's handy, a tube-flaring tool can be used instead of the split wood block. Be sure the razor blade projects into the rubber tube only far enough to cut the one side.—*E. R. Speakman, Venice, Cal.*

Short Cuts and Tips

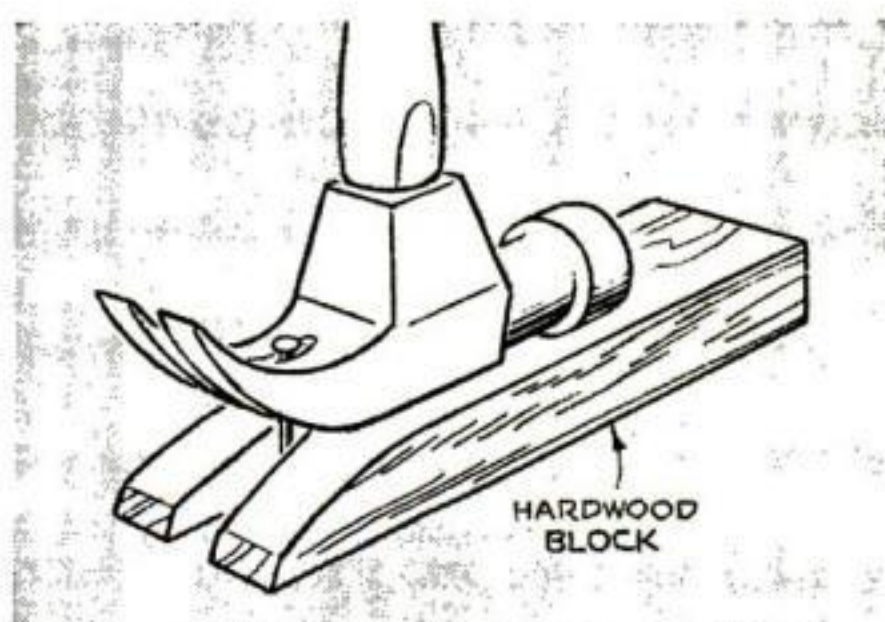
FROM PS READERS



Magazine for a Single-Shot

CARTRIDGES for a single-shot rifle can be quickly removed from a magazine on the side of the forearm. Cement a pistol or rifle magazine to a shim contoured to fit the rifle stock. Best position is with bullets pointing downward, opening toward the muzzle. Practice makes loading fast.—*C. G. Sykes, Newton, Ia.*

▶▶▶THE WHEELS of my boy's bicycle ran crookedly—and I had no nipple wrench to adjust the spokes. But I did have a glass cutter—and one of the notches in it was just the right size to fit the spoke nipples.—*Einar W. Antonson, Duluth, Minn.*

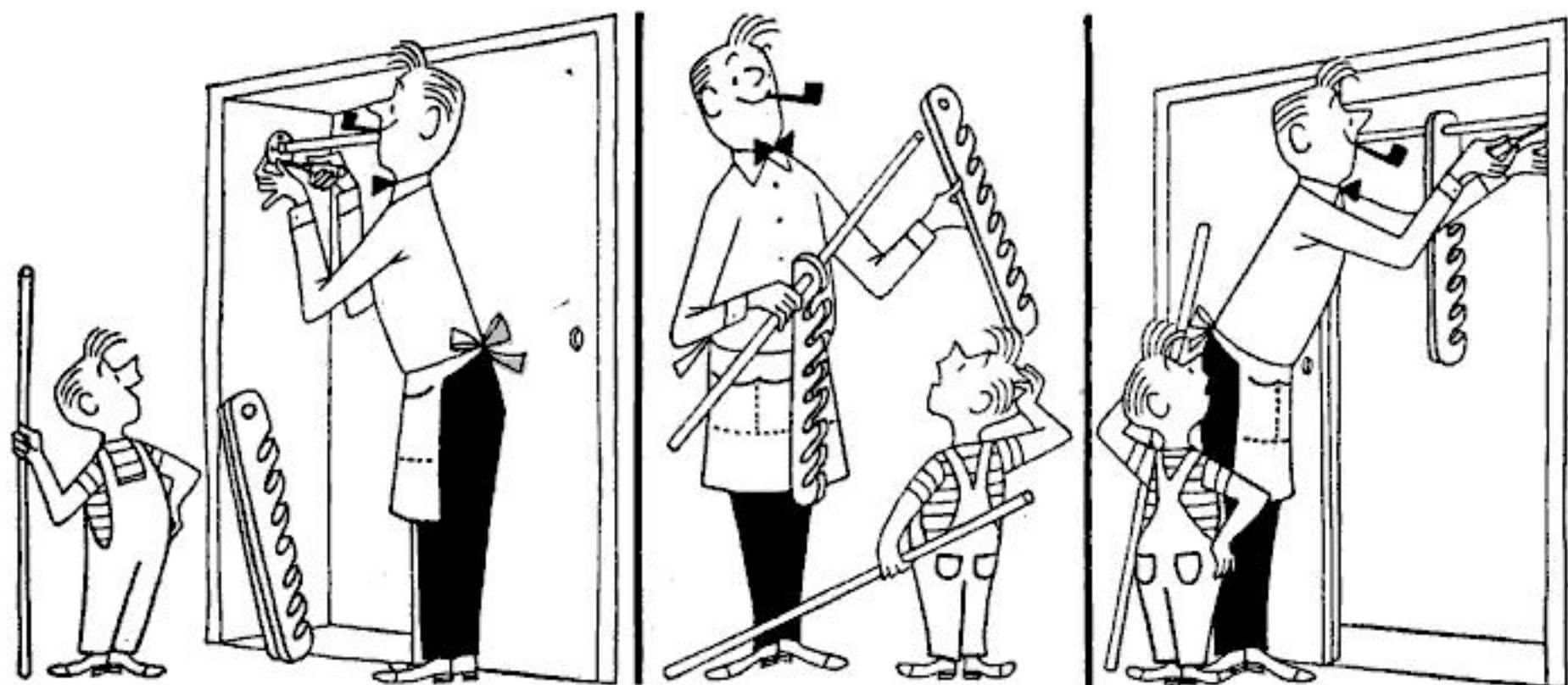
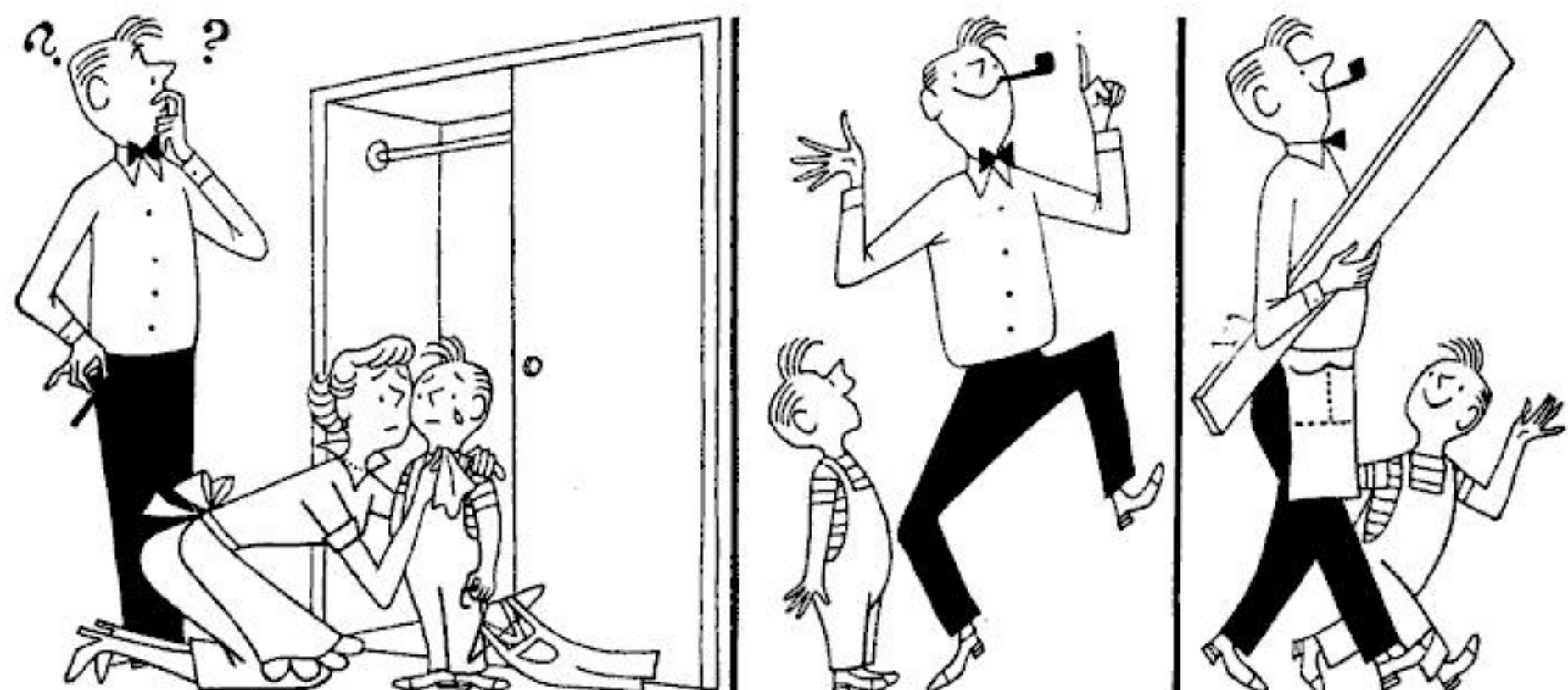
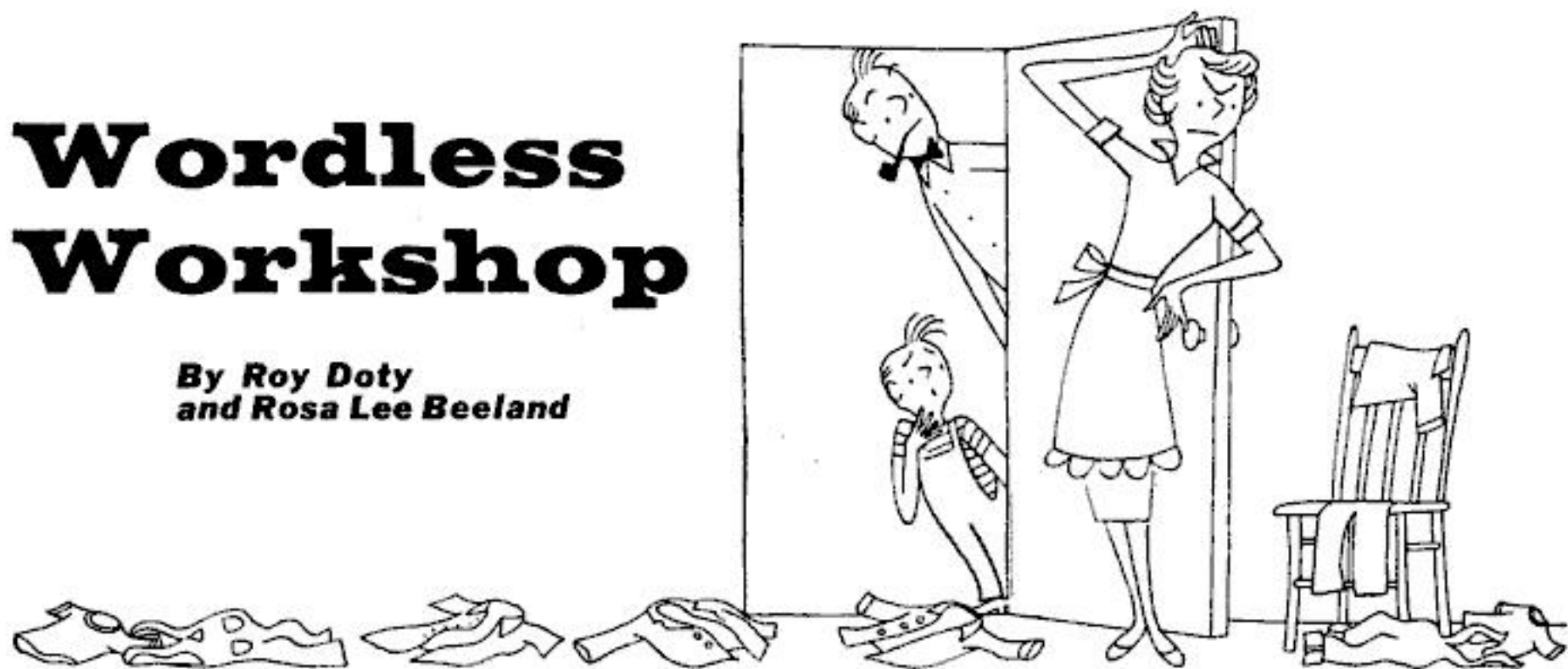


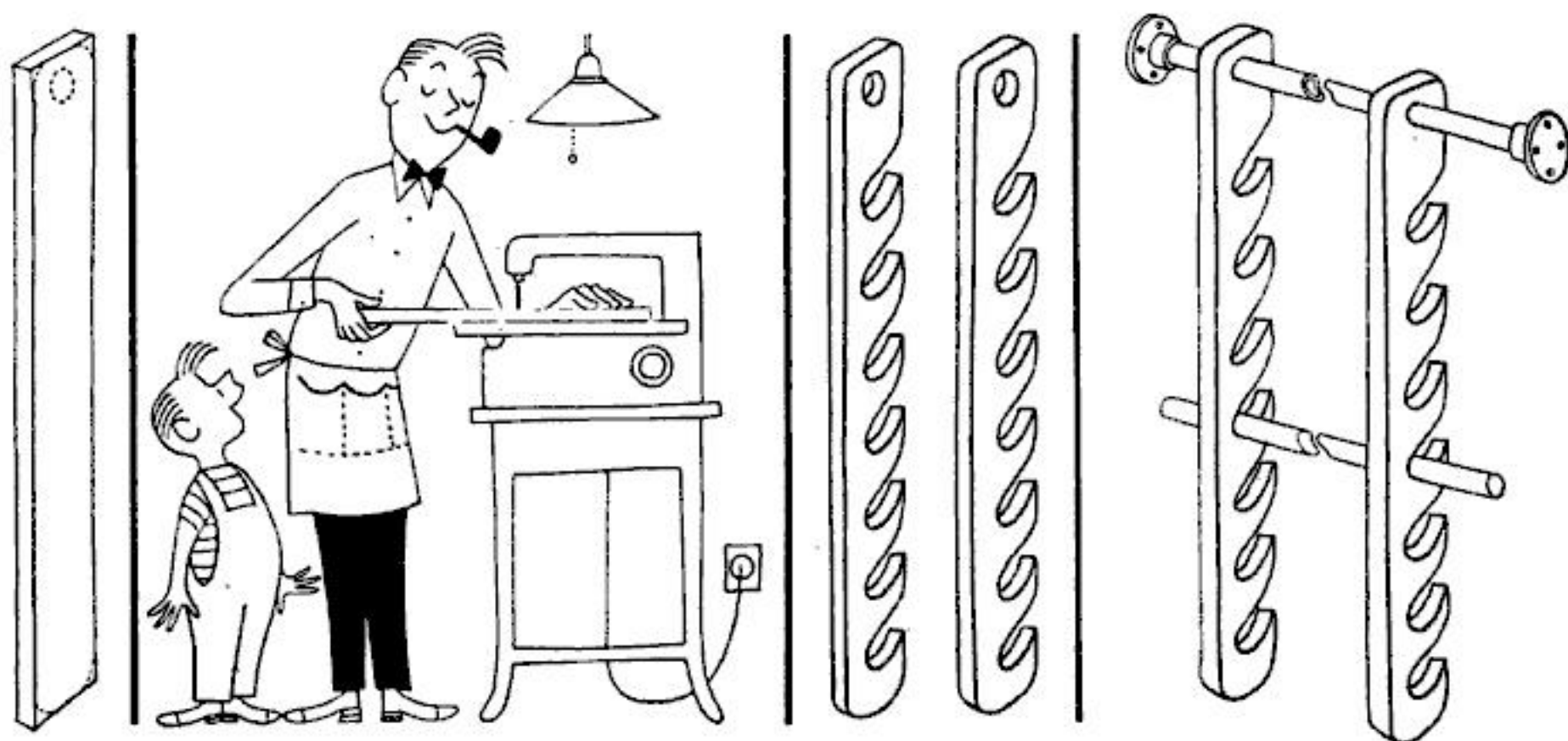
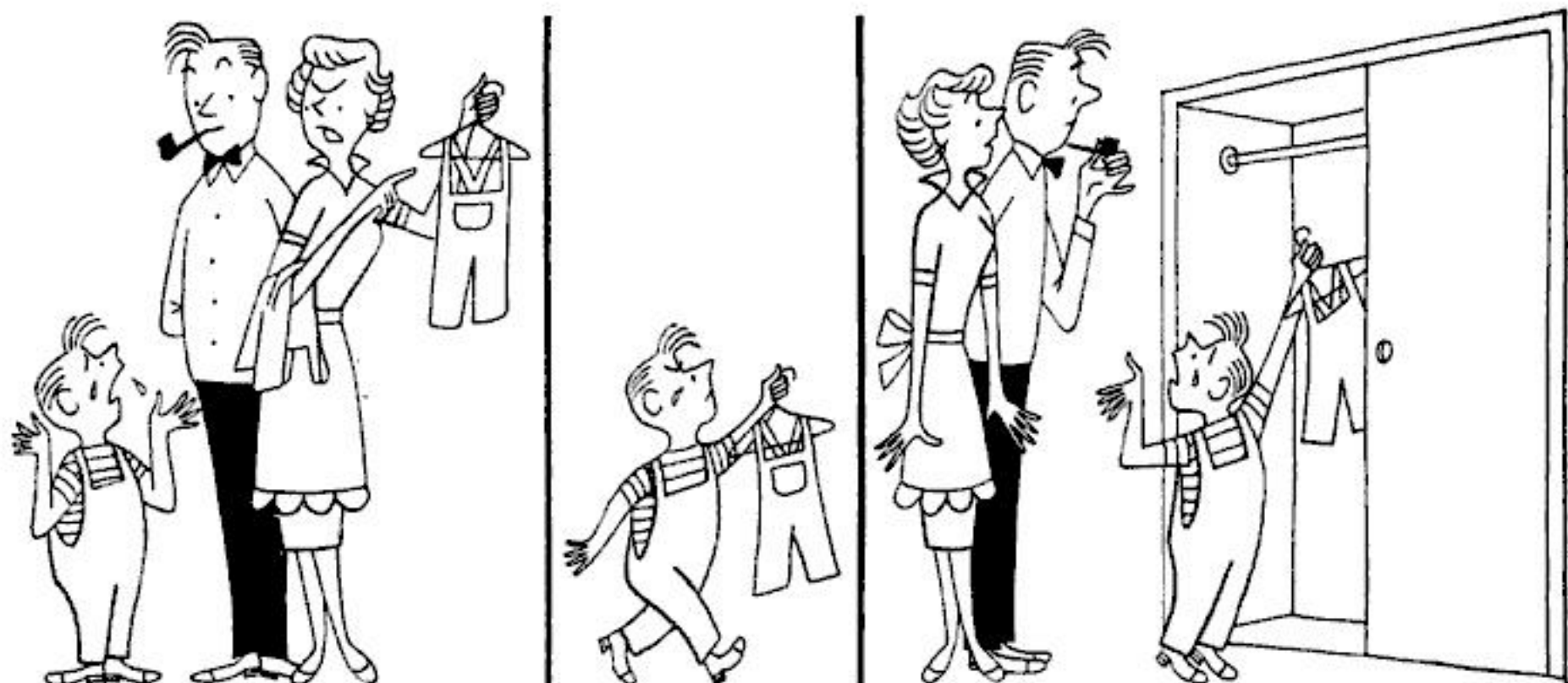
Slotted Block for Nail Pulling

NAILS can be pulled easier, and without bending, if a slotted, wedge-shaped block is used instead of the usual solid one. As the nail is withdrawn the slotted block is slipped farther under the hammer head for a straight upward pull. For best results and durability, the slotted block should be slightly curved, as shown above, and cut from hardwood.—*Burton L. Wollenzien, Grand Junction, Col.*

Wordless Workshop

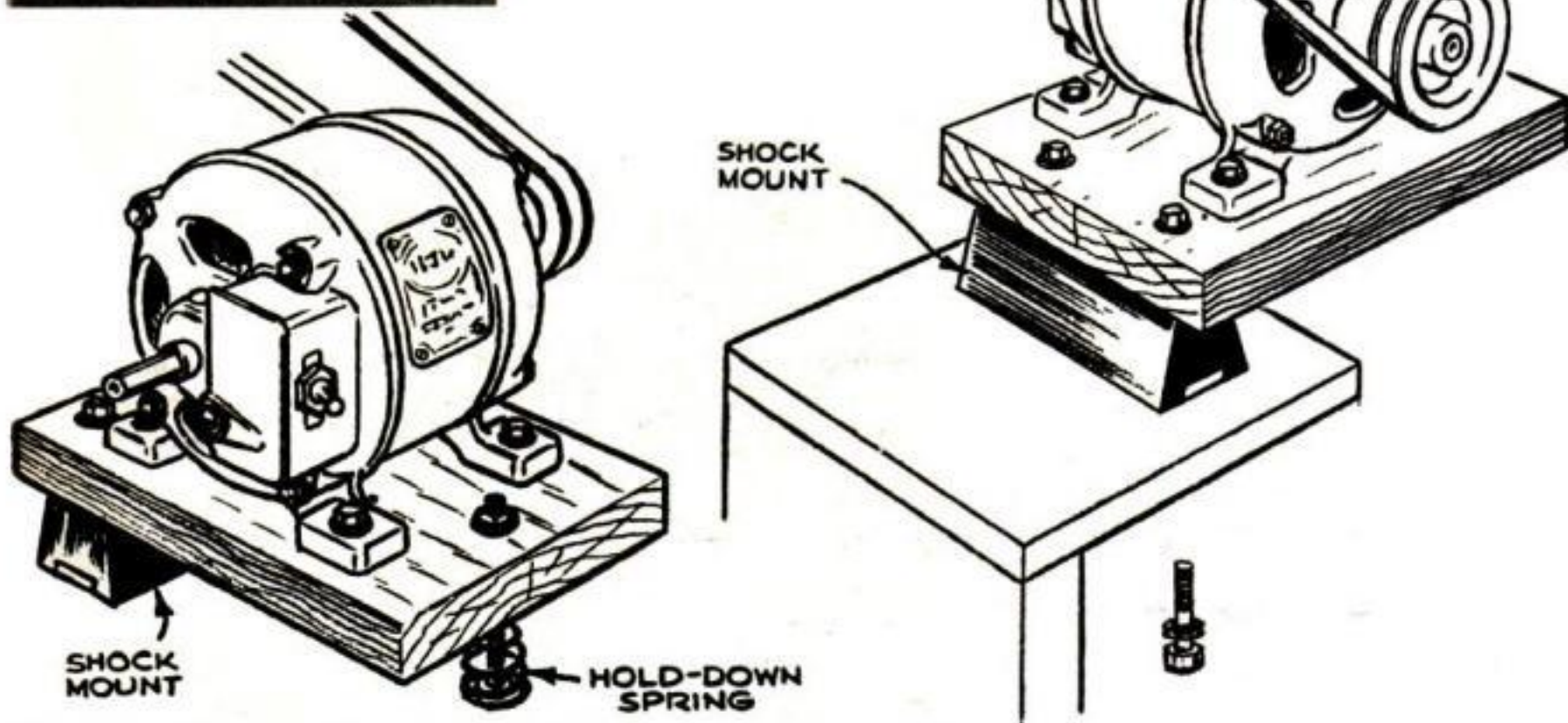
By Roy Doty
and Rosa Lee Beeland





Short Cuts and Tips

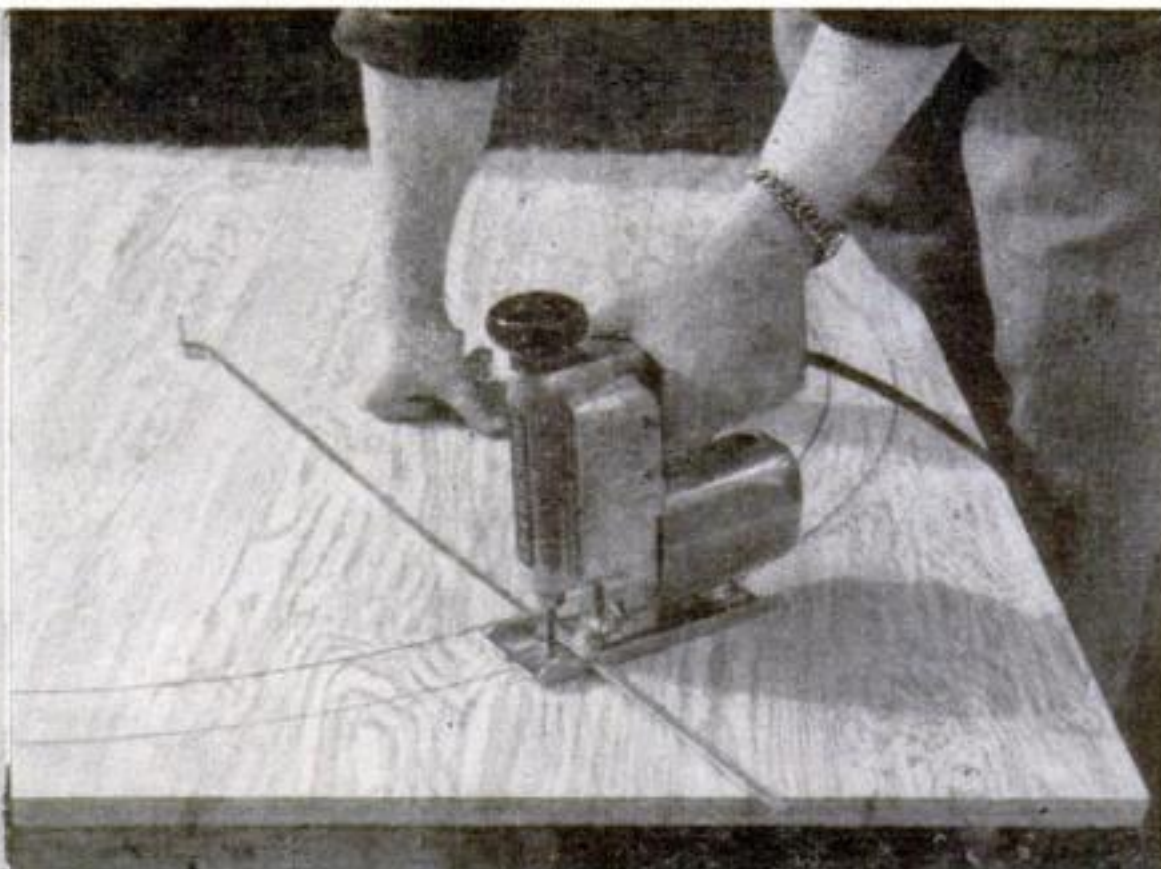
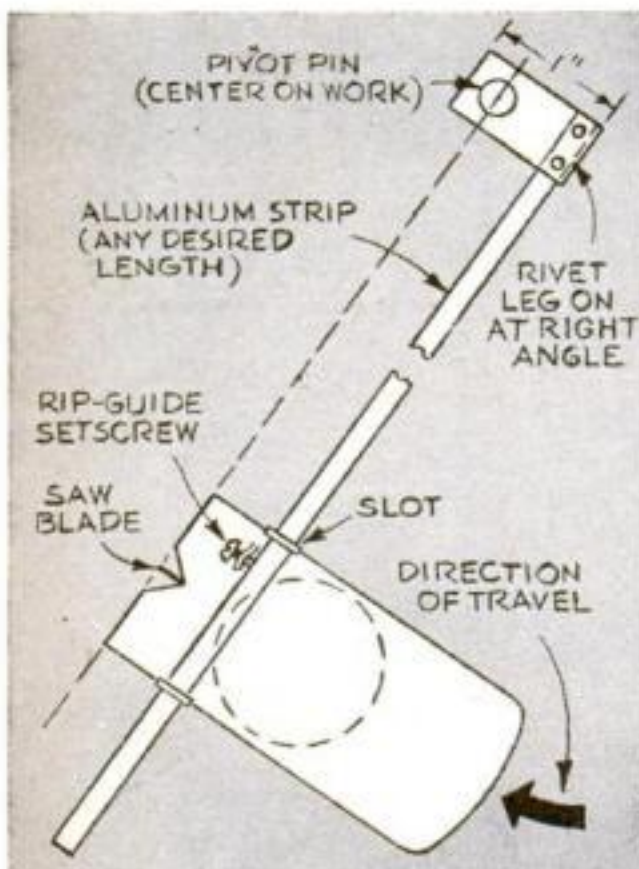
FROM PS READERS



Utility Motor Mount Cuts Down Vibration

DISCARDED automobile-engine mounts make flexible but sturdy supports for electric motors in the shop. A mount used at the transmission end of a three-point suspension system consists of a block of rubber with metal bonded to two sides. Such a mount, placed under one end of

the wooden platform to which a $\frac{1}{4}$ -hp. motor is bolted, will let the motor weight keep the belt taut. For heavier motors, a compression spring installed under the outboard end of the board will take some weight off the belt and help dampen vibration.—Don Engdahl, Santa Rosa, Calif.



Radius Bar Guides Saber Saw

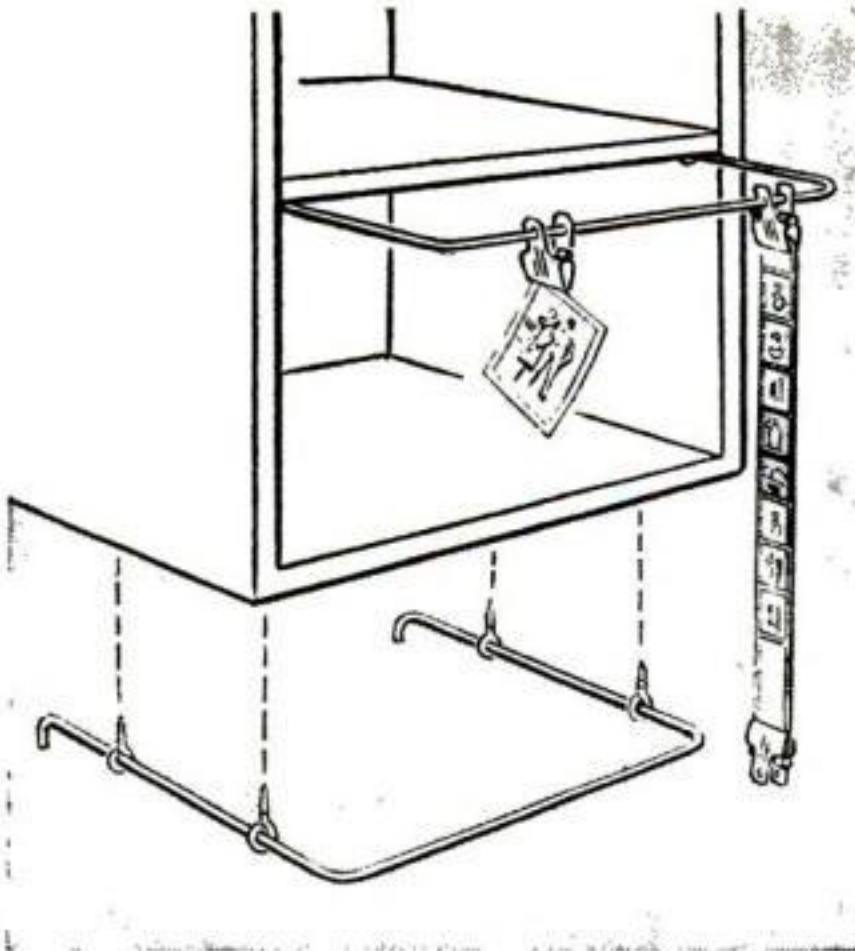
AN ALUMINUM bar about $\frac{1}{32}$ " thick, locked in the slots normally used for the saber saw's rip-guide attachment, will swing the saw in a perfect arc for cutting circles. Pivot the offset end of the guide

bar on a pin set in a hole drilled in the center of the circle.

You may find that some saw blades have too much lead, or tendency to run off the line, so experiment with different blades until you find one that cuts true.—Carlton G. Bucher, White Plains, N.Y.

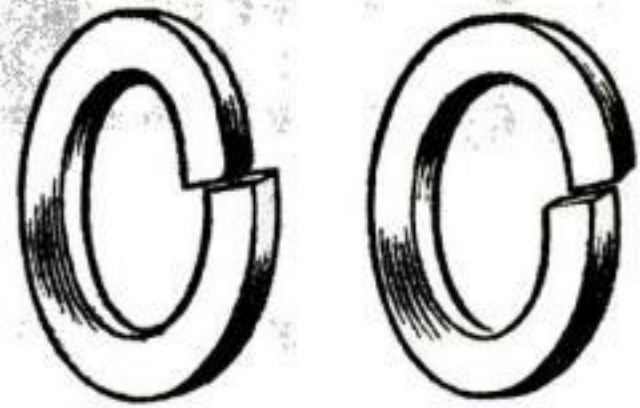
Short Cuts and Tips

FROM PS READERS



Retractable Film Racks

SHORT of space in your darkroom? Mounted on the underside of shelves and work tables, these wire drying racks push out of the way when not in use. Shape heavy wire into a U (the size depending on where it's to be attached) and feed this into four screw-eyes spaced to take it. Bend down a $\frac{1}{2}$ " stop at each end.
—D. O. Van Gilder, Denver.



STANDARD

REVERSED

Left-Hand Lock Washer

AT THE hardware store, they thought it was a variation on the monkey-wrench gag, but I really needed a left-hand lock washer. The standard type tends to loosen a nut with left-hand threads; the torque is tensioned against the nut in the wrong direction. I reversed a standard right-hand washer with a twist in the vise.—
Robert A. Brown, Shelbyville, Tenn.



What Would You Do

... with a post to
set and no level or
plumb bob at hand

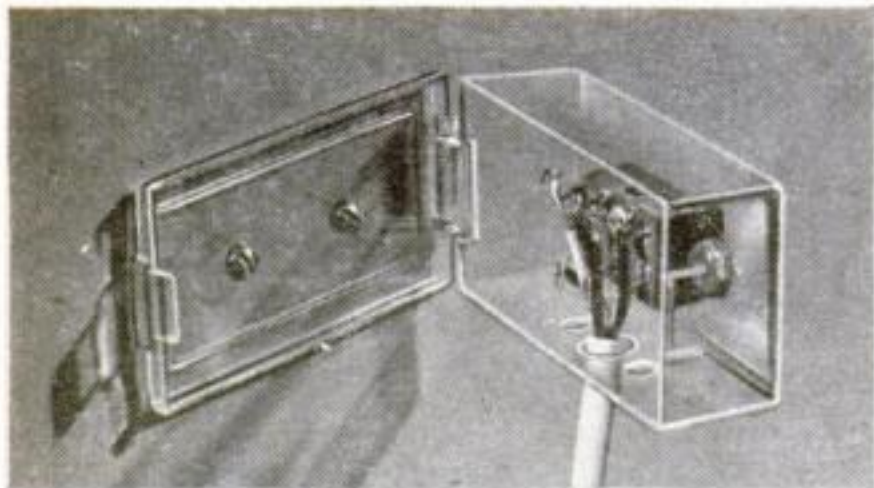
You might very well work out something with a string and a weight. But there's a quicker system.

Just sight along the post and a known plumb line, for instance the corner of a nearby house. Even a power pole is fairly dependable if there's no better vertical to check against.

Darrell Huff, Pacific Grove, Calif.

Short Cuts and Tips

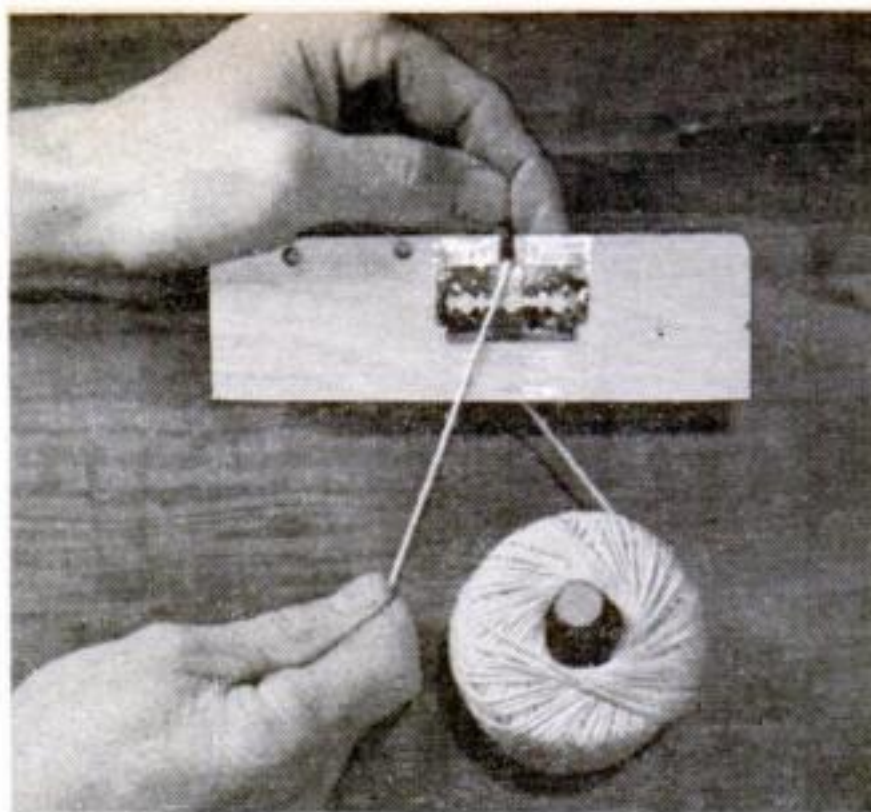
FROM PS READERS



Mount Switch in Plastic Box

A PLASTIC box of the type used to package small hardware items makes a neat housing for a low-voltage electrical switch. The surface mounting requires no cutting into the wall. Bolt the switch to the base of the box and drill holes through one side for the connecting wires. Attach the hinged lid to the wall at an inconspicuous spot, using small screws.

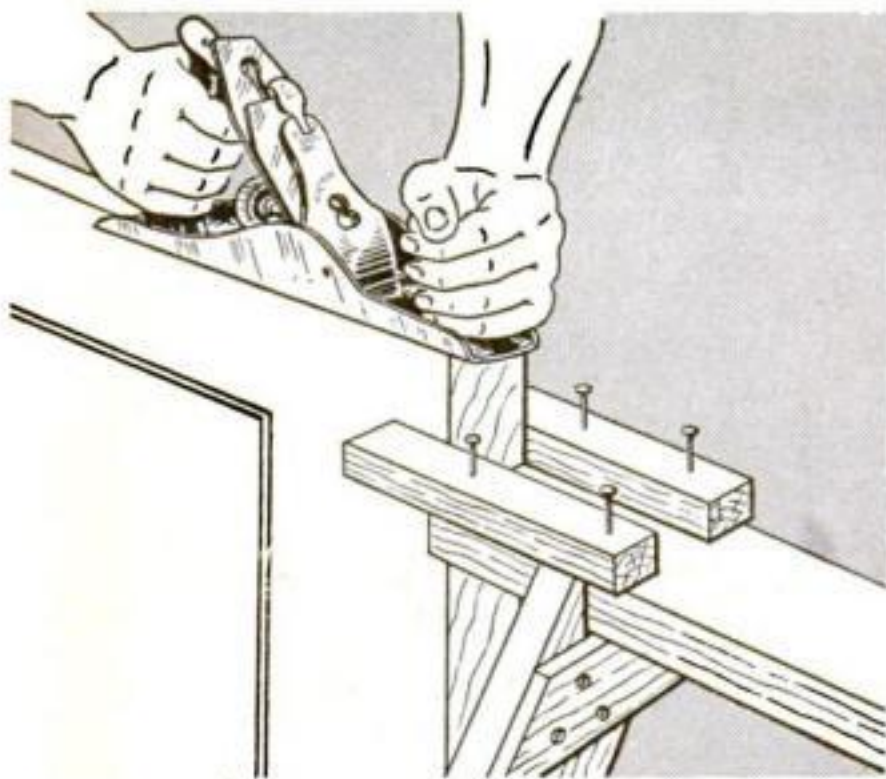
Access to the switch is easy—simply a matter of springing the catch and pivoting the box on its hinges. I found this mounting useful in wiring up a hi-fi speaker-selection system in various rooms throughout my house.—*Carlton Bucher, White Plains, N. Y.*



Razor-Blade String Cutter

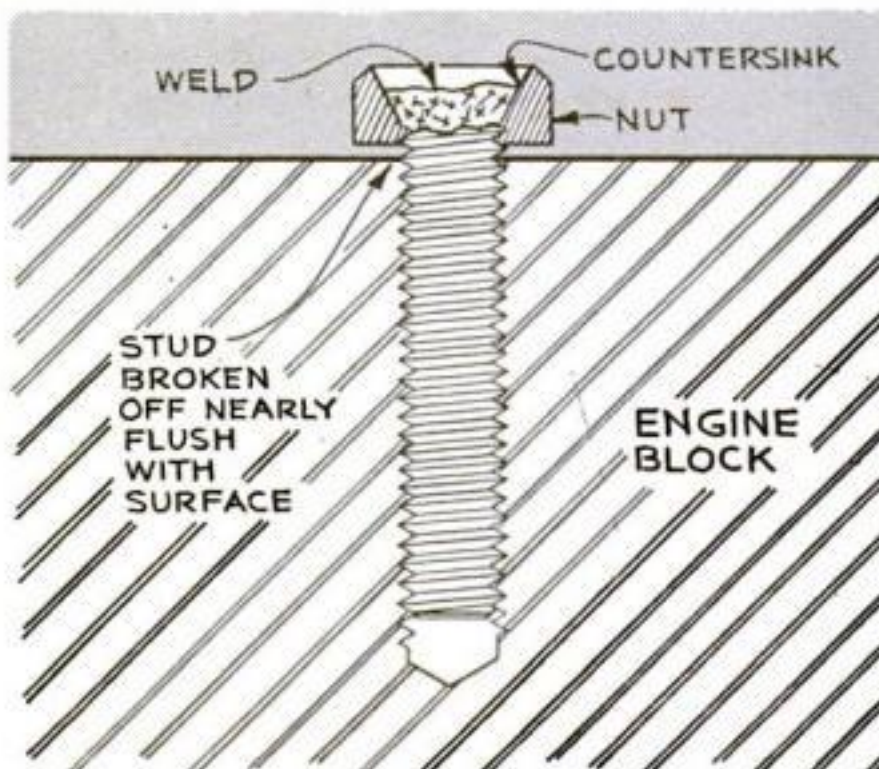
MAKE a simple string cutter for the shop by attaching a single- or double-edge razor blade to scrap plywood with cellophane tape. The cutting edge should project a little above the bottom of a notch cut in the plywood to protect the fingers. Mount the unit on a spacer block, near a peg for the ball of string.

▶▶▶ CUTTING sheet aluminum with a jig or coping-saw is easier and faster if you first score the pattern with a scribe. To score straight lines, draw a linoleum knife along a straightedge. This also minimizes binding and breakage of blades.—*Norman E. Nelson, Milwaukee.*



Sawhorse Jig for Planing Doors

PLANING door edges is easier if you wedge the door between two pieces of scrap nailed to the top of a sawhorse. Back the sawhorse against a wall.—*Daniel Bousha, Jackson, Mich.*



Removing a Frozen Stud

WHEN the head breaks off a stud you're trying to remove, you can often weld on a nut. Countersink the top for easier access to the joint and a more secure weld.—*Don Huss, Tiffin, Ohio.*



Fixing Horizontal-Sweep Faults

The horizontal-sweep circuit is about the hardest-working part of your TV set. Not only does it paint, electronically, the horizontal lines on the screen, but it also makes the high voltage for the picture tube (in partnership with the high-voltage-rectifier tube). The 10,000 to 20,000 volts produced slam the electrons in the picture tube against the phosphor-coated screen to give light.

In most sets, the horizontal-output tube will have to be replaced more often than any other tube. But take care. One of the case histories that follows will show you what I mean.

By Art Margolis

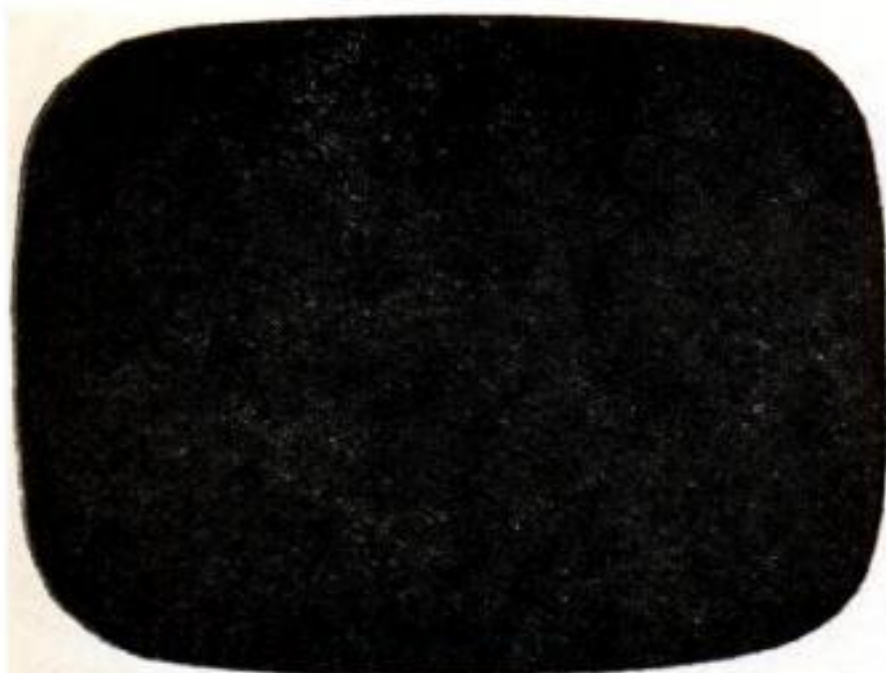
OUR local eye doctor, Dr. Cain Price, was "helping" me adjust his TV set. "No, no, Art—back the other way," he said in that overly patient tone one might use on a backward child.

The repair had been simple enough. His seven-year-old console had a classic case of horizontal bends. Depending on the strength of the channel, the picture distortion varied from a slight to an extreme S curve that made the performers look like hula dancers.

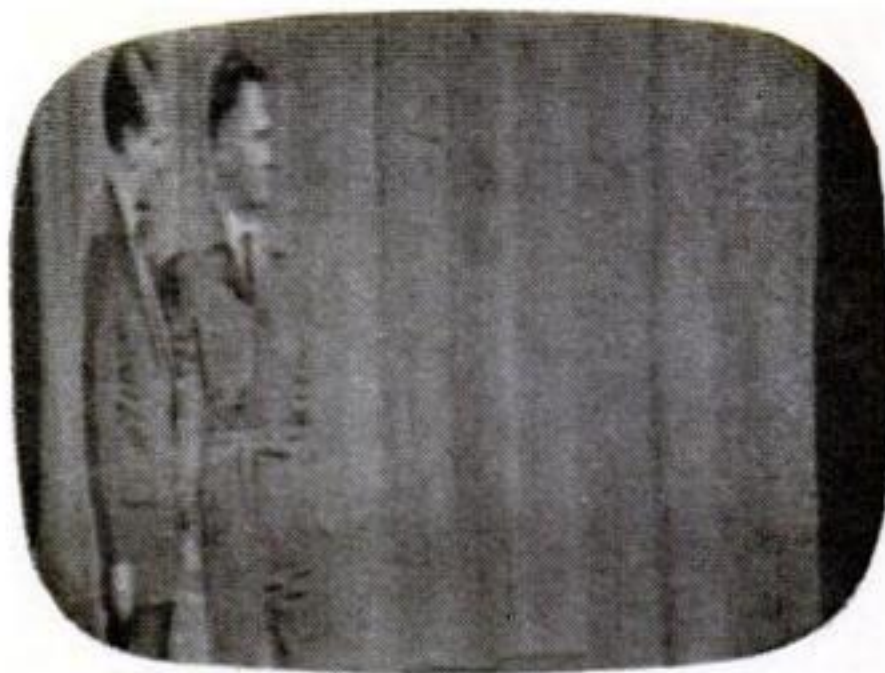
CONTINUED

167

Faulty tubes in the horizontal-sweep circuit



SCREEN IS DARK but sound is okay. Check these tubes by substitution in order: horizontal oscillator, horizontal output, high-voltage rectifier, damper and low-voltage rectifier.



HORIZONTAL SHRINKING, often due to aged horizontal tubes or low-voltage rectifier. Adjust the width control. Replace horizontal oscillator, output, and low-voltage rectifier.

These symptoms are typical of stray 60-cycle AC in the horizontal-sweep signal. Easiest way for a voltage at the power-line frequency to get mixed up with the horizontal sweep is through the filaments of the horizontal tubes. If a leak or a short develops between the filament and cathode, the picture will get the bends.

When I replaced the horizontal-oscillator and -output tubes, the bends vanished. The electronic part of the service call was easy; with a little adjustment of the size and linearity controls, I could have been on my way in five minutes. But the doctor, as an expert on matters visual, had assumed command of the adjusting operation.

After a solid 15 minutes of turning the controls back and forth while he peered at the picture through his trifocals, it seemed that I was still no closer to satisfying the critical professional eye. I switched tactics.

After making sure the picture was adjusted to my satisfaction, I said, "Now, Doc, I am going to turn real, real, slow. You stop me when I've got it right on the nose."

I reached behind the set, but didn't touch the control. "How's that, Doc?" I asked.

"Almost, Art. Almost," he said.

Still not touching a thing, I asked, "How about that?"

"Another hair, Art, just a hair."

I steadied my wrist with my other

hand but still moved nothing. "Well?" I whispered.

"That's it," he snapped. "Hold it. A perfect picture. Don't touch it."

The Costliest Tube Change

FLO, the druggist's wife, sounded a little desperate over the phone: "Art, would you please come over? Joe doesn't know I'm calling, so sort of drop in."

Joe is an independent cuss and the most avid do-it-yourselfer in town. And "yourself" is not just a figure of speech.

They live upstairs over their store. I rang and Joe called from a window, his tone belligerent: "What do you want?"

"Joe, can I use your phone?"

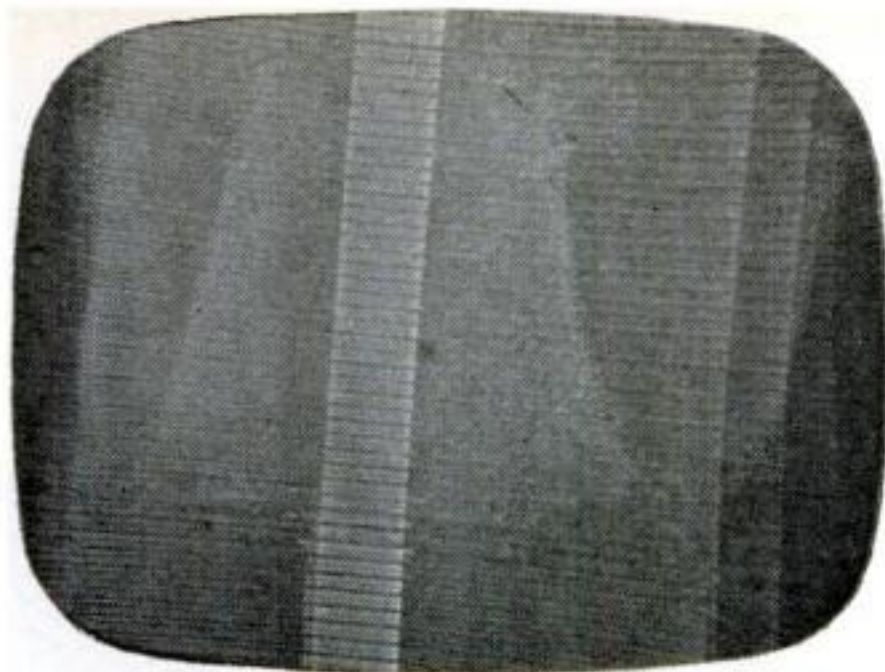
He calmed down and called hospitably, "Oh, sure, Art, come on up."

When I walked in I saw the TV through an archway. A pile of TV tubes and cartons were strewn about. I recognized the brand as that from the self-service tube-tester display in his store.

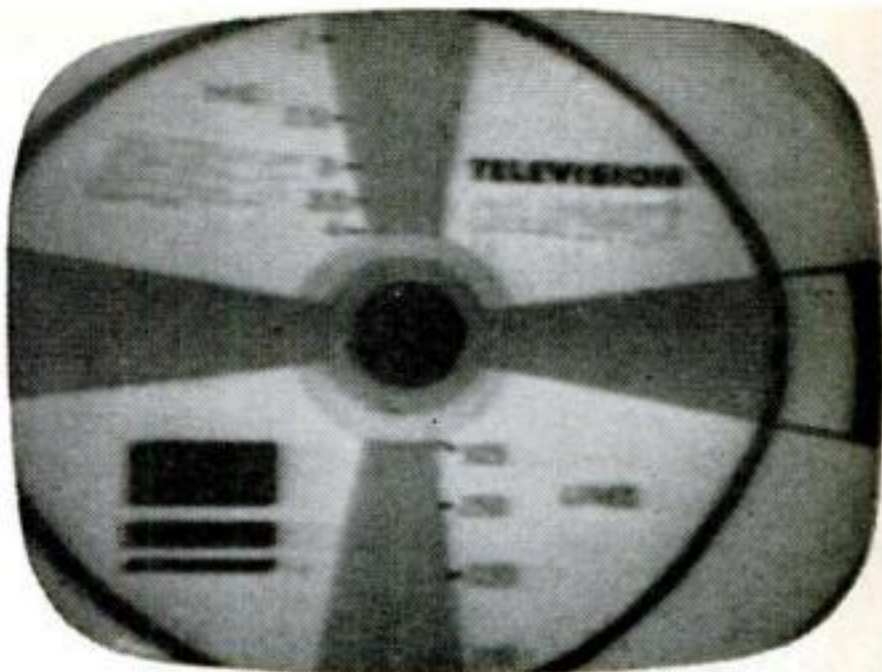
I ignored the TV, sat down at the phone, and dialed my shop. I knew nobody was there. Out of the corner of my eye I counted 10 6BQ6 horizontal-output tubes. Joe was putting in one \$4.35 tube after another and watching his money burn up. He had fallen into a familiar booby trap.

Here's what happens: The horizontal tubes—oscillator and output amplifier—work together to manufacture the electromagnetic force that sweeps the electron

of your set can cause any of these troubles



CHRISTMAS-TREE EFFECT often accompanied by a singing or hissing noise from inside the set. Change horizontal-phase-detector or oscillator tube, adjust horizontal-phase control.



TOO MUCH WIDTH AND NONLINEAR SWEEP. Adjusting width and horizontal-linearity controls usually fixes this. If not, try changing the horizontal tubes and high-voltage rectifier.

stream in the picture tube back and forth across the screen. The resulting horizontal lines must be drawn at the rate of 15,750 lines per second. The oscillator generates the required 15,750-cycle signal and the output amplifier beefs it up until it is strong enough to sweep the electron beam across the full width of the tube face.

But the output tube is all muscle and no brains. Like a spooked horse without a rider, it'll run itself to death if the oscillator quits. It is utterly dependent on the oscillator to keep it from drawing more current than it can take safely.

This was what booby-trapped Joe. When he saw the output tube glowing cherry red, he had correctly assumed that it was defective. But he didn't know about the role of the oscillator. Being the stubborn sort, he kept on putting in output tubes and burning them up. First thing he should have done was check the oscillator tube before putting in a new output tube.

Still sitting at Joe's phone, I made like I was talking to a customer while my shop phone rang unanswered.

"Yes, Mr. Smith, you say your 6BQ6 tube keeps burning up and you've already replaced three of them."

Joe didn't look at me, but his ears seemed to bend. I continued, "That's an old familiar symptom, Mr. Smith. Replace the 6CG7 oscillator tube and you'll stop burning up the 'BQ6s."

When I turned around, Joe was gone,



BLOOMING is expansion of the picture when the brightness is turned up. It is caused by lowered high voltage. Try replacing high-voltage-rectifier tube and horizontal-output tube.

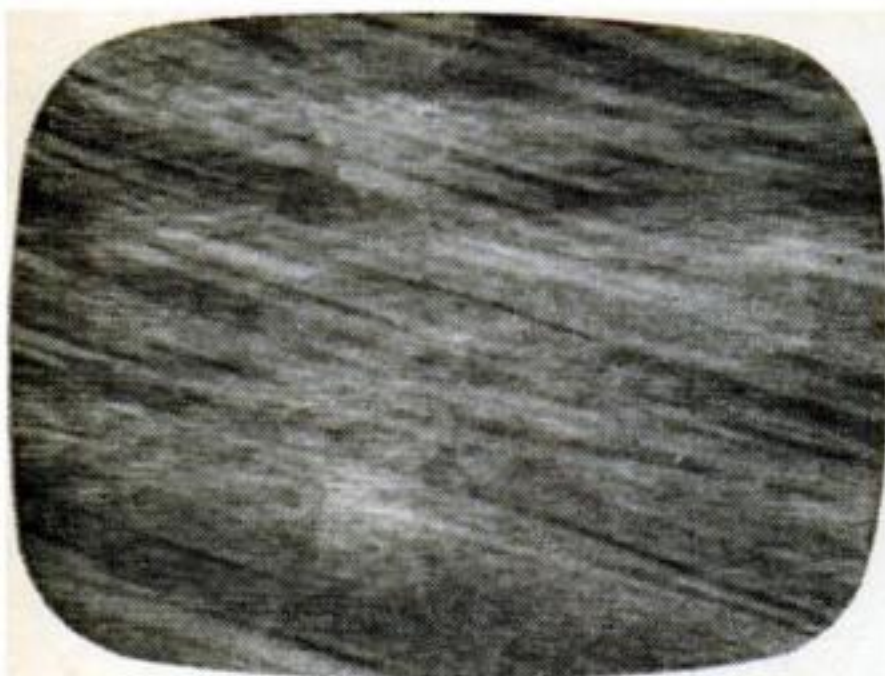


BARKHAUSEN OSCILLATION. This shows up on the screen as one or more vertical beady lines. It is caused by unwanted oscillation of the horizontal-output tube. Try a new tube.

CONTINUED

169

These faults, too, are usually cured by new horizontal tubes



HORIZONTAL SWEEP completely off frequency (mixed pattern of mainly diagonal lines). Adjust horizontal hold, change horizontal-oscillator and/or horizontal-phase-detector tubes.



HORIZONTAL PULL, caused by filament-to-cathode leakage in one or more horizontal-circuit tubes. Change horizontal-oscillator, horizontal-output, or horizontal-phase-detector tubes.

but I heard a clatter on the stairs to the store. I winked at Flo. Joe was back in a flash. Trying to be casual he crumpled a carton from a 6CG7 in his hand and let it drop to the floor as he reached into the set with his other hand.

I said good-bye to my imaginary customer and walked to the archway. "Thanks for the phone, Joe."

He had plugged in the set and was twisting dials. The picture came in crisp and bright. "Any time, Art, any time," he said absent-mindedly. Arms folded, he was looking triumphantly at Flo.

The Wife Who Couldn't See Trouble

HENNY TOWNES is married to a sweet gal. Her only flaw, in Henny's eyes, is that she is a militant teetotaler. However, she usually observes an unspoken truce on his apple-cider nips.

The threatened collapse of this truce brought me a service call from Greta.

"Art, come over and settle an argument. Henny insists there's something wrong with the TV but I can't see any trouble. He's been drinking too much."

Amused, yet uneasy about walking into a family argument, I hurried over.

The floorboards creaked and groaned under me as I followed Greta into the living room. Henny sat in front of the TV, glass in hand and a pitcher of cider beside him. The TV was shining brightly.

"You won't believe it," he said, "but the TV was dark till you two came

through the door." Greta gave me a what-did-I-tell-you look. I shrugged.

I sat down and absent-mindedly accepted the cider Henny offered. Too late I realized I wasn't helping the domestic crisis. Greta stamped out of the room.

"Hey, Art, look," Henny said excitedly. Then he yelled, "Greta, c'mere."

The screen had gone black. I turned to see Greta's face as she came in.

"Well?" she said. I looked back at the TV. It was shining again.

As Greta stamped out, I saw it happen. The horizontal sweep collapsed into one vertical white line in the center of the screen and disappeared.

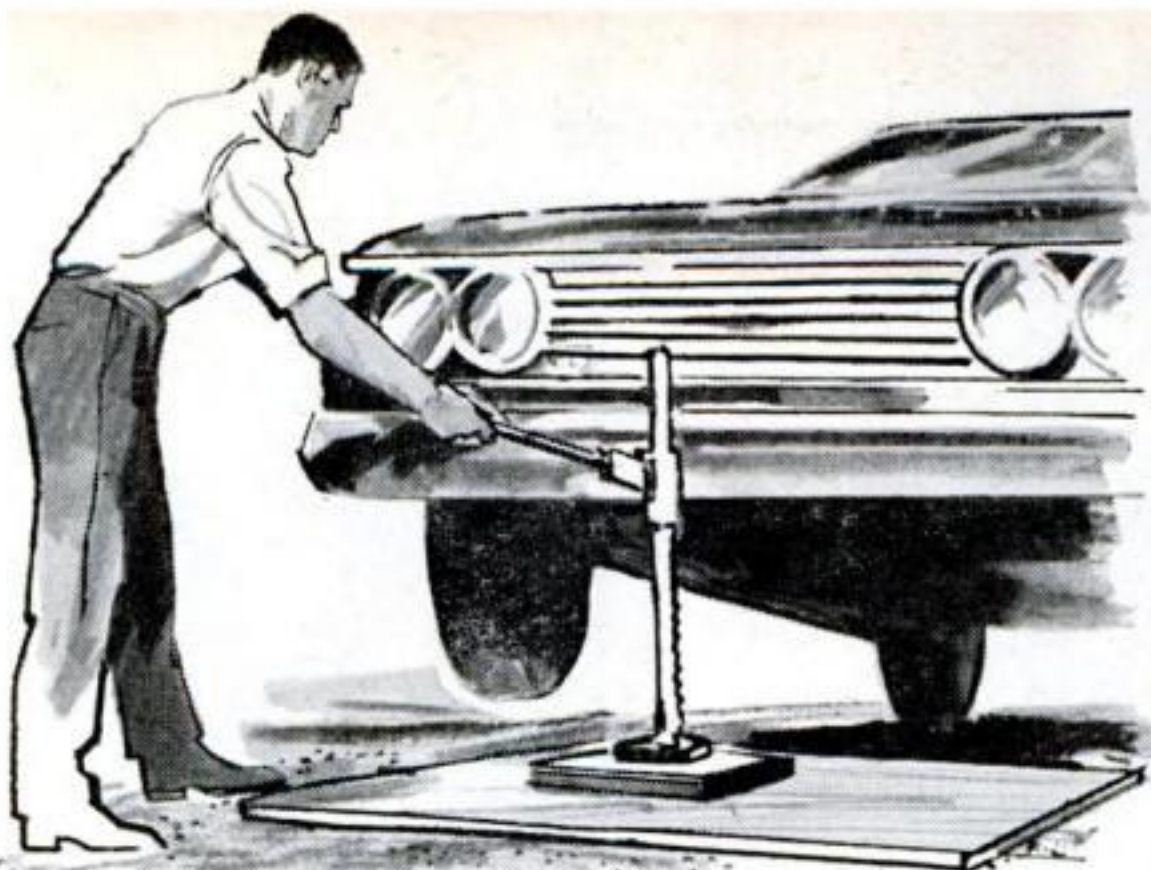
I knew what was happening. The horizontal oscillator was quitting intermittently. High voltage in modern sets is made from a by-product of the horizontal sweep. No horizontal sweep—no high voltage. No high voltage—no brightness.

I removed the back and plugged in my cheater cord. By tapping the horizontal oscillator, I could make the picture come and go. Loose tube elements were shorting intermittently. Evidently a loose floorboard was jostling the set enough to do this when anyone stepped in the room.

I wanted to restore family harmony with a demonstration. I called, "Greta, would you come in again, please."

"What for, to chase pink elephants for you two sots?" she answered, angrily.

I've never claimed any talent as a domestic-relations counselor. I replaced the offending tube and got out fast.

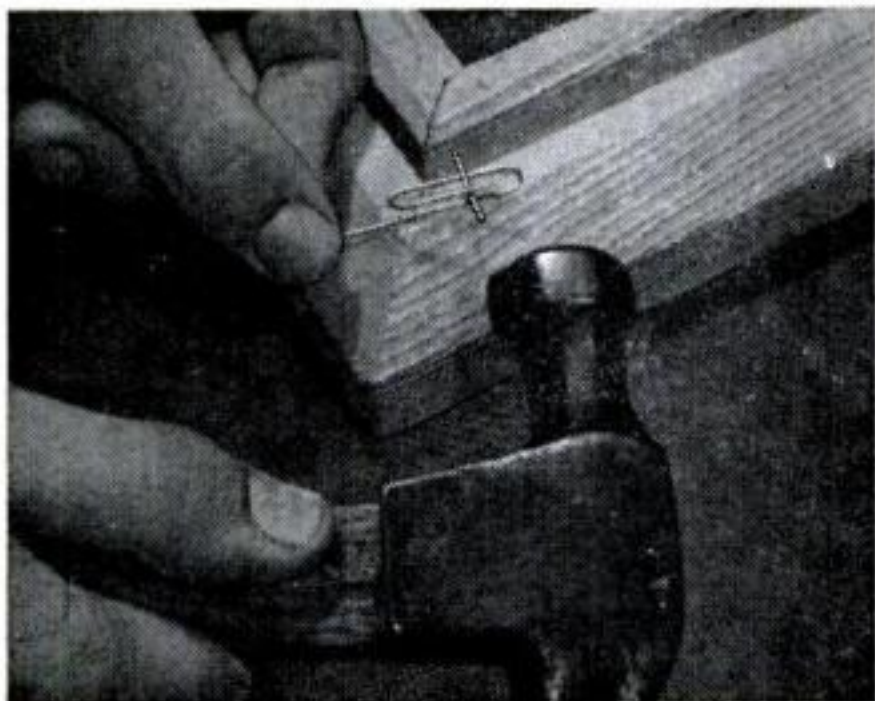


Short Cuts and Tips

FROM PS READERS

Jacked-Up Car for Awkward Glue Job

LACKING a clamp to hold a block in the center of a large panel of plywood while the glue set, I slipped the panel under my car, placed the bumper jack on the block, and left the car jacked up overnight.—*Roland Loewen, Baytown, Tex.*

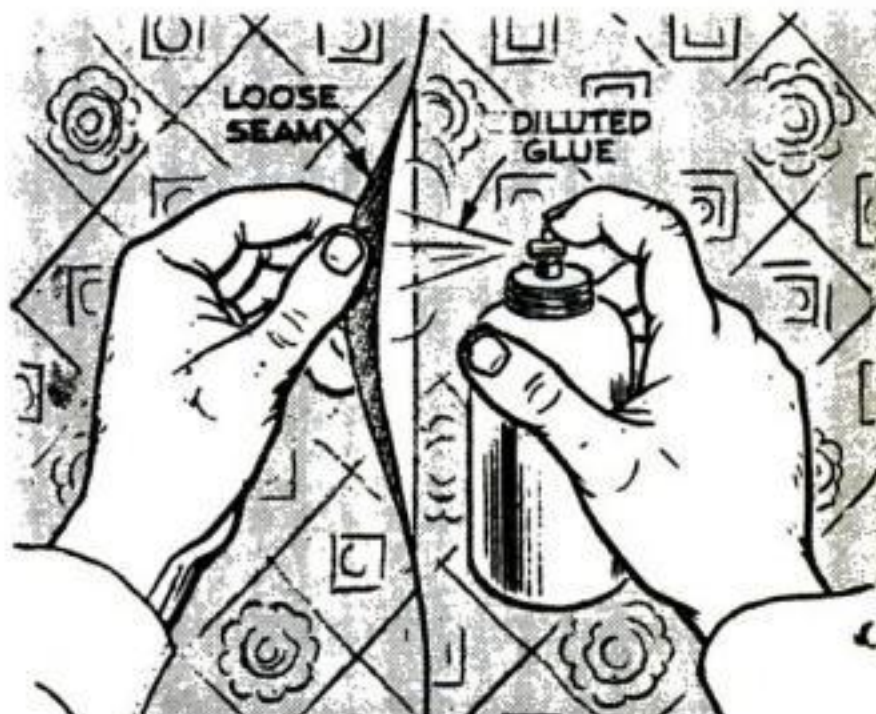


Paper-Clip Nail Holder

It's clumsy—and risky—to hold small nails or brads in the fingers for driving. Unbend the outside loop of a paper clip to serve as a handle and insert the nail beneath the inner end. Once the nail is started, pull the clip free and finish driving.—*Wayne Floyd, Fayetteville, Tenn.*

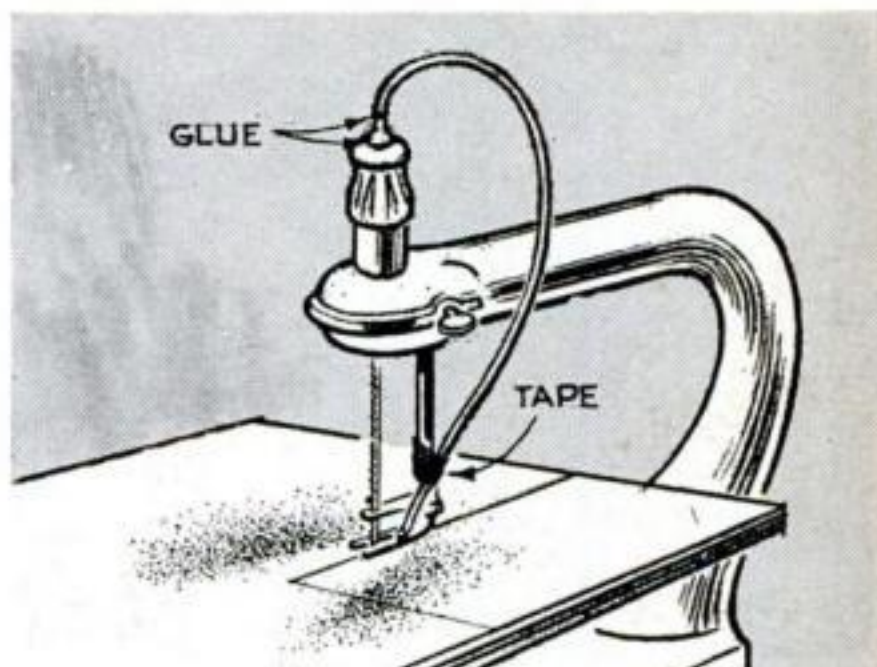
Dust Blower for Jigsaw

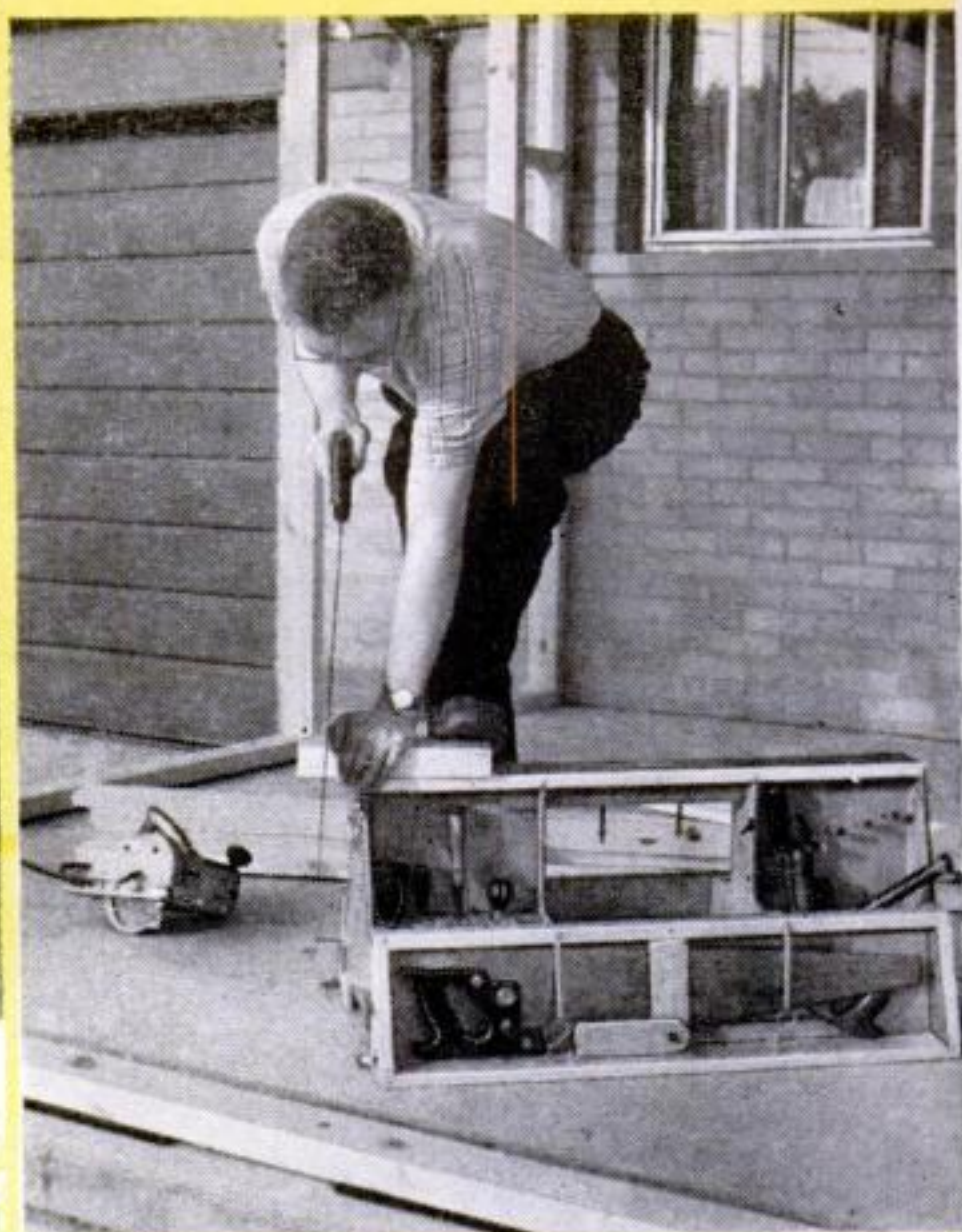
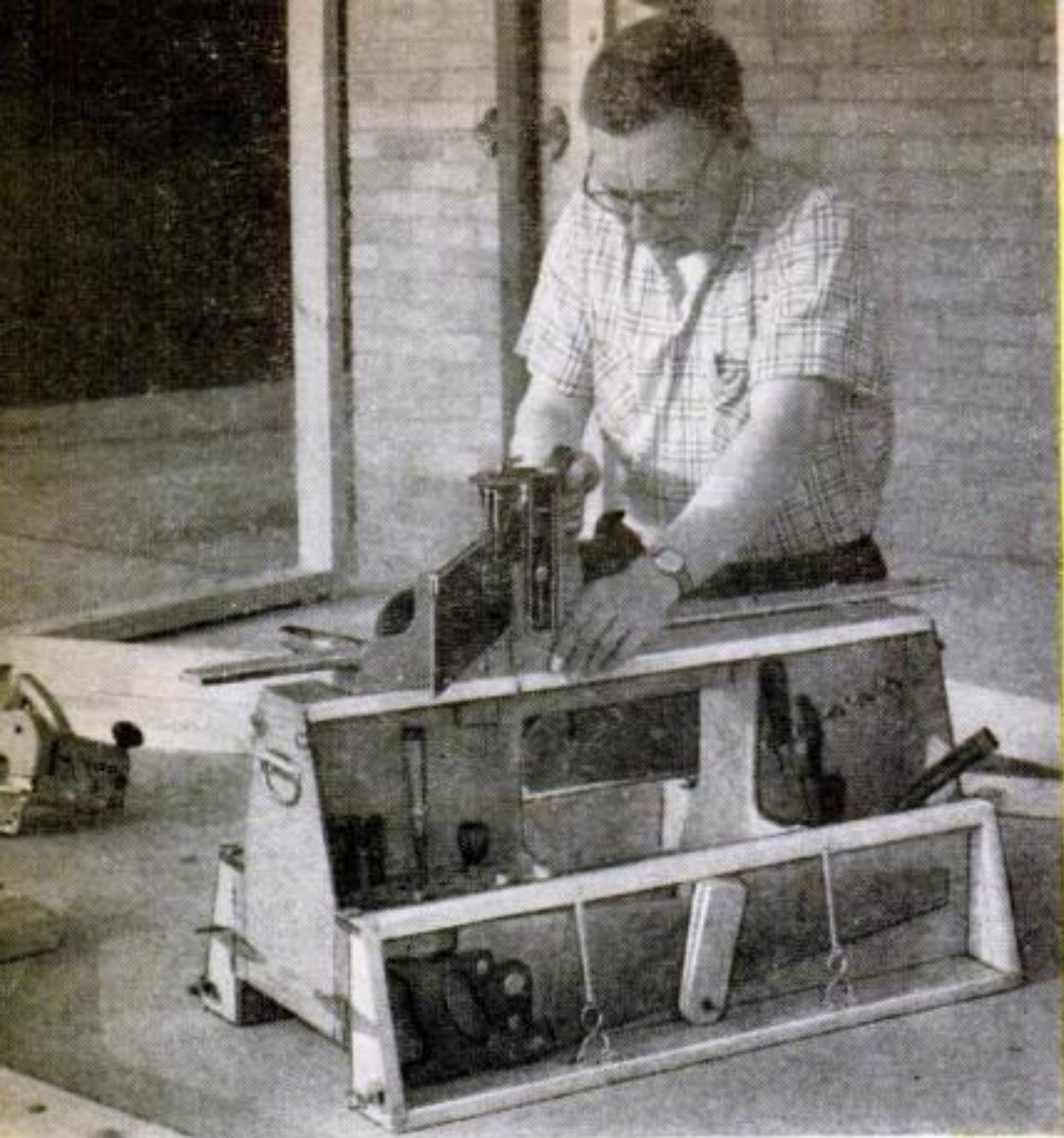
SINCE my jigsaw wasn't equipped with a blower, sawdust kept hiding the line to be cut. I could feel an air current from the top end of the reciprocating-piston shaft when the blade was in motion, so I put this to work. I capped the shaft with a rubber crutch tip that had been vented to take the nozzle from a plastic glue dispenser. I fastened one end of a piece of plastic tubing to the nozzle and taped the other end to the guide shaft to direct the air toward the saw blade.—*V. R. Nicholas, Kokomo, Ind.*



Regluing Wallpaper Seams

BRUSHING paste into loosened wallpaper seams often results in torn or stretched paper. Instead, dilute white plastic glue with an equal amount of water and use a window-cleaner bottle to spray a coat on the back of the overlapping sheet.—*Ken Murray, Colon, Mich.*





BUILD THE Work- Horse Box

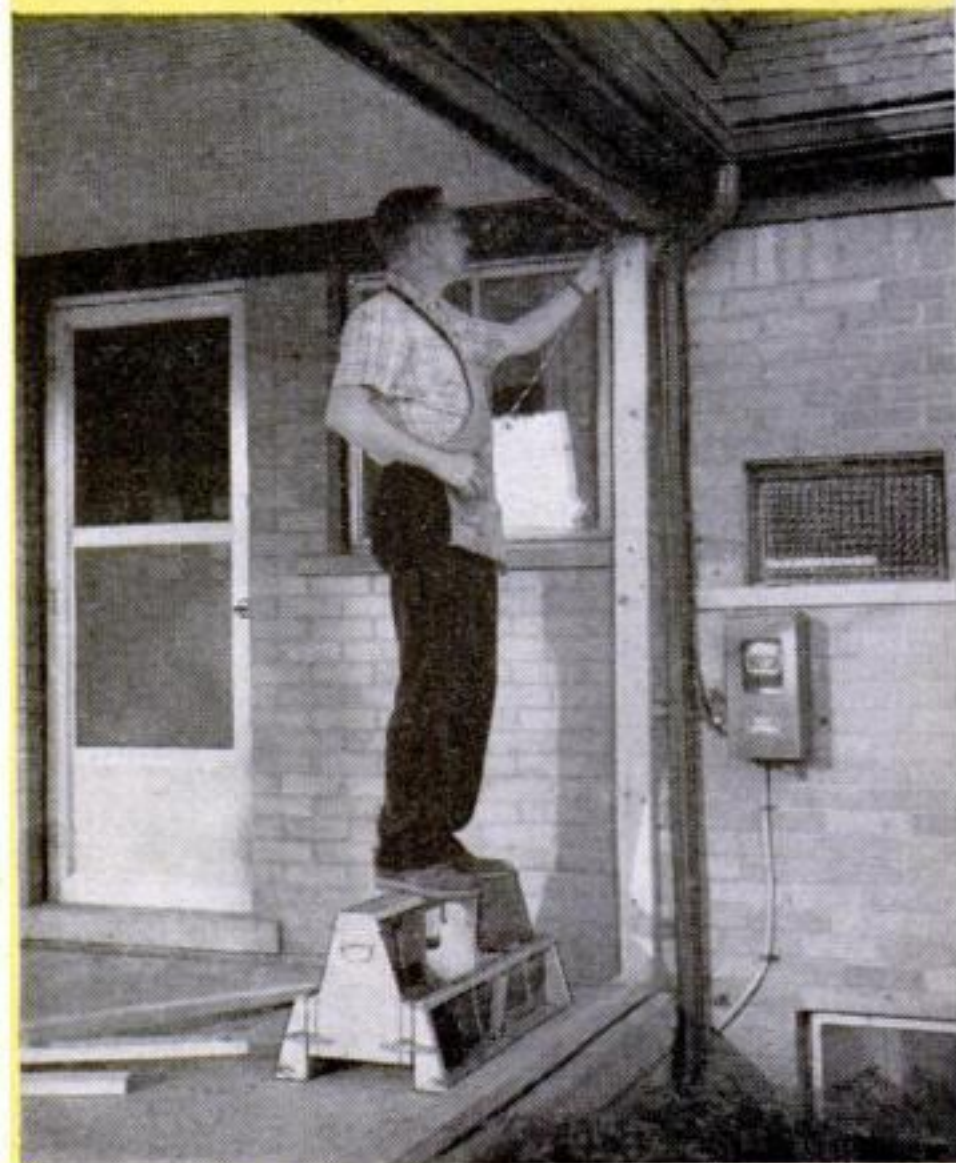
It's a workbench . . . It's a sawhorse . . . It's a tool box

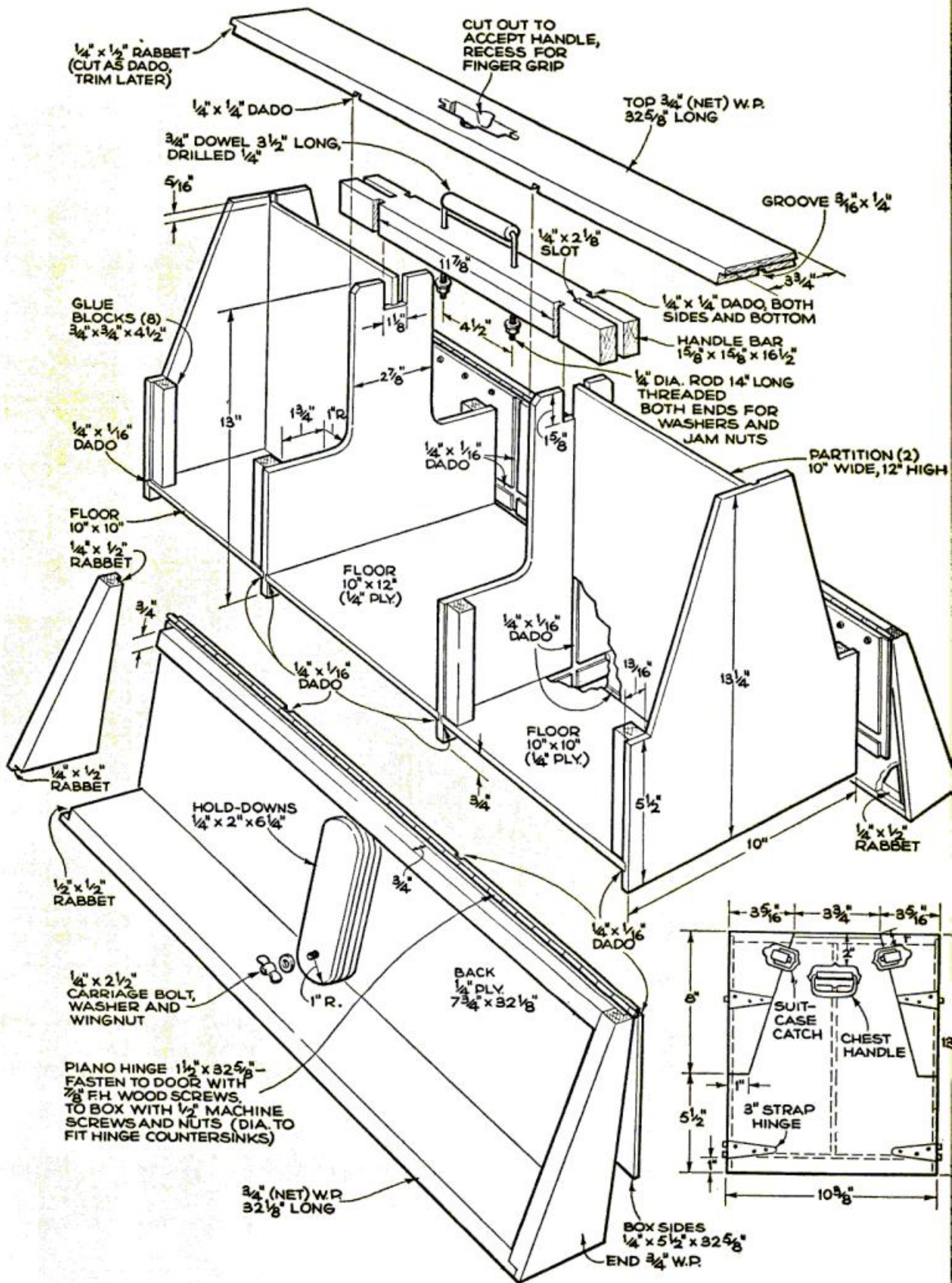
By Ernest E. Hickman

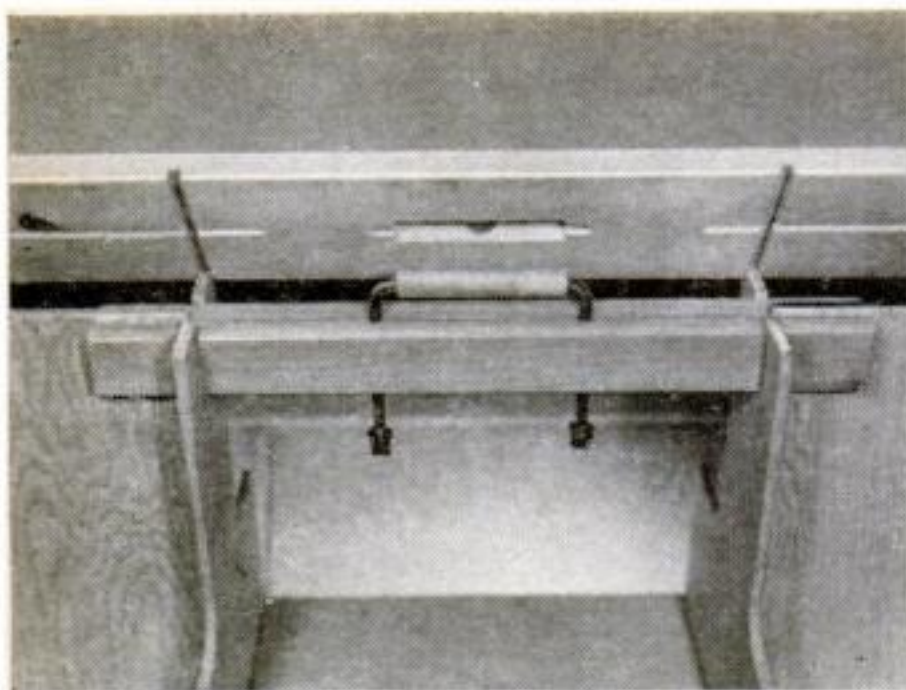
IF YOU'VE ever needed your tools where they weren't, you'll appreciate this work-horse box. No ordinary tool chest, this one is ideal for toting some or all of your tools upstairs, downstairs, or over the hills to Grandma's house. That's because it:

- Holds all the tools you can lift.
- Racks them for protected travel.
- Spreads its feet to become a low sawhorse.
- Serves as a miniature workbench with a built-in planing stop (the retractable handle).
- Is just the right height for standing on to reach the ceiling.
- Is sturdy enough to support one

WITH ITS FLAPS DOWN—and locked—the tool box functions as an off-the-floor workbench (above, left) or a knee-high sawhorse (above) for hand or power tools. It also makes a sturdy utility stool (below) or a support for a scaffold.



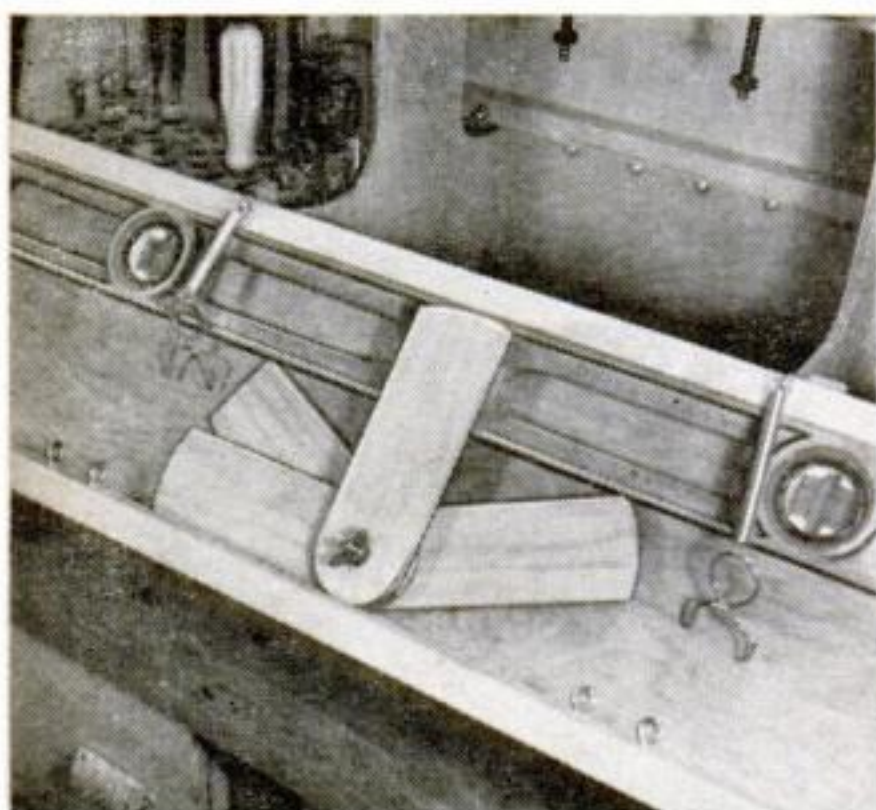




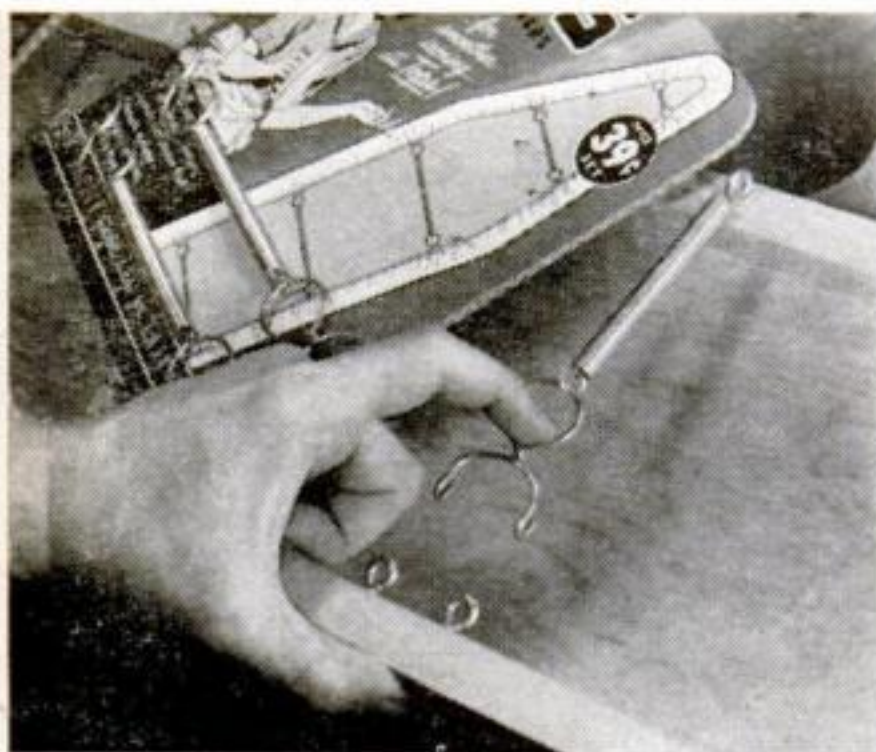
UNDERSIDE OF TOP is grooved to take partitions which are also set into dados and slots in the handle bar. The center hole lets the handle pass



through and is provided, on top, with rasped notches. These let your fingers grip and lift the handle for carrying the box to the job.



STACK OF PLYWOOD LEAVES pivoting on bolt inside the door adapts to hold different sizes and shapes. One leaf swings over a tool, others against it; a wingnut clamps the leaves tight.



COIL-SPRING STRAPS are modified ironing-board-cover fasteners stretched between screw-eyes. They strap objects to the inside of the door or, looped around them, clasp them tightly.

end of a plank scaffold bearing two men.

The high strength and low weight come from using a light material— $\frac{1}{4}$ " plywood—in frameless, stressed-skin construction. The pieces interlock, the edge of each gripped by a dado in its mate. The $\frac{1}{16}$ " dados are shallow enough to preserve the plywood's strength, but deep enough to provide a good grip when the pieces are joined with glue.

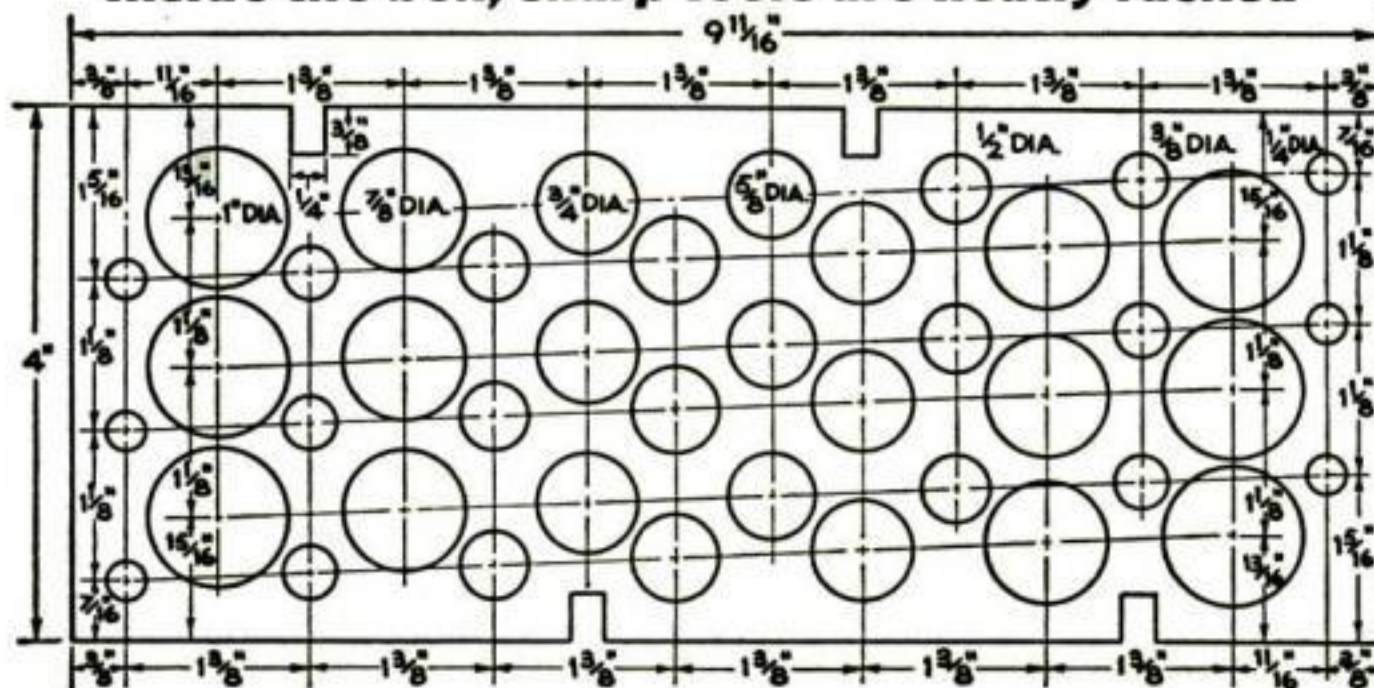
If a dado head or router isn't available for making these grooves, you can substitute strips of small molding, glued and nailed along butt joints.

For strong joints, the plywood should have clean, square edges; use a hollow-ground or special plywood blade in a table saw to cut out the parts. Cut the plywood partitions and ends before swapping the blade for a dado head. By grooving and dadoing these pieces while they're still rectangles, you'll be able to make all the grooves with only two settings of the rip fence. Only the short vertical grooves in the side pieces require use of the miter gauge.

Putting the box together. This is easier if you make the top and side pieces over-length. That way, you can cut dados instead of rabbets at the ends; these will help lock the parts in place while you glue them together. You can trim the surplus after the glue sets.

First glue the lengthwise partitions into the dados of both end pieces of the three-piece floor. To each resulting T-shaped section, add an end piece and a cross partition. Small brads through the joints will help keep the parts aligned while you clamp them. Put the

Inside the box, sharp tools are neatly racked



LAY OUT PATTERN for 42 holes in six ranks on the $\frac{1}{4}$ "-plywood top panel. Brad this to two more blanks and bore all three simultaneously, using drills graduated from $\frac{1}{4}$ " to 1". Glue notched posts in place. Rack prevents nicked chisels and dulled drills.

center panel of the floor between the two end sections and draw snug with bar clamps.

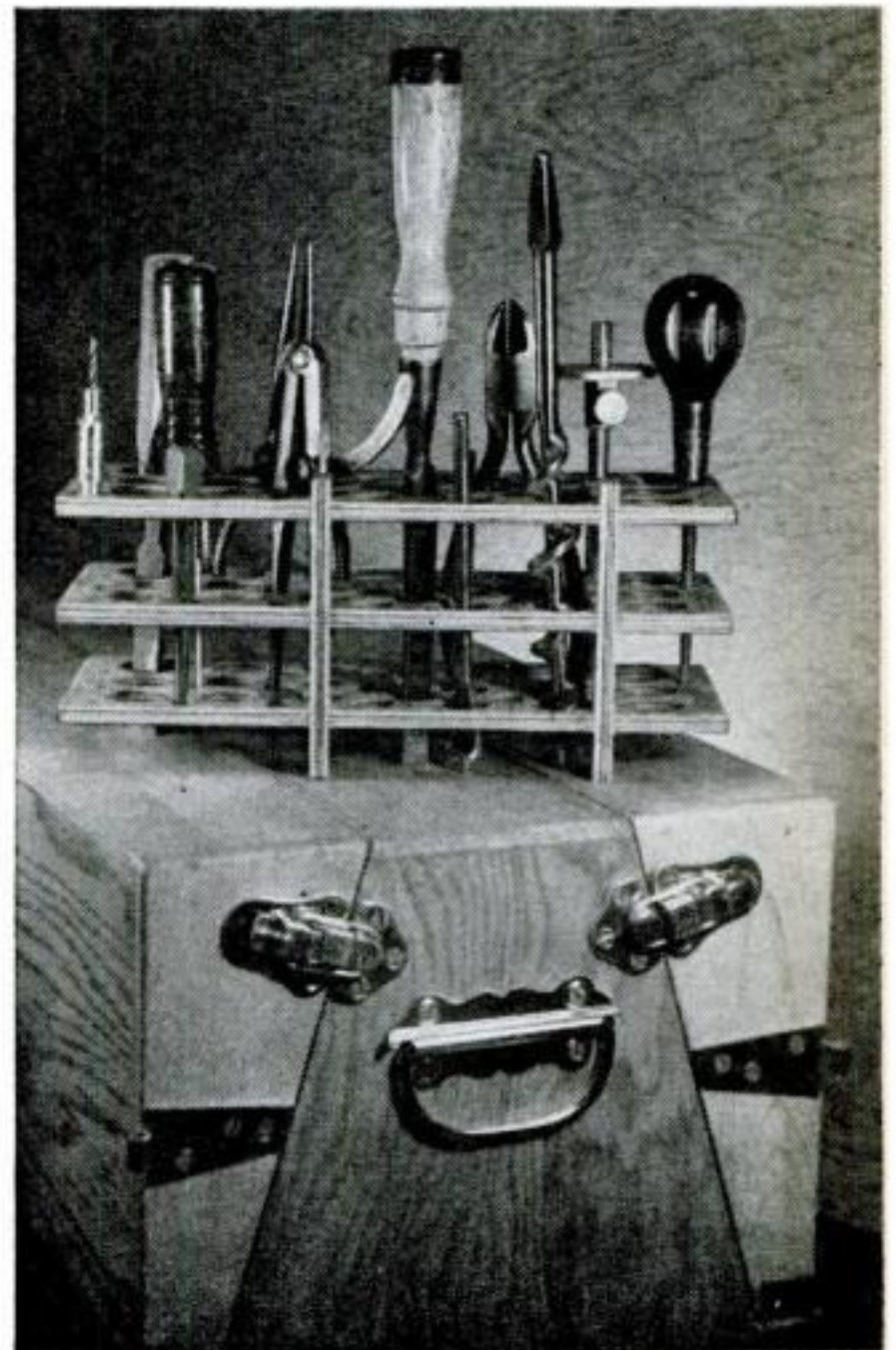
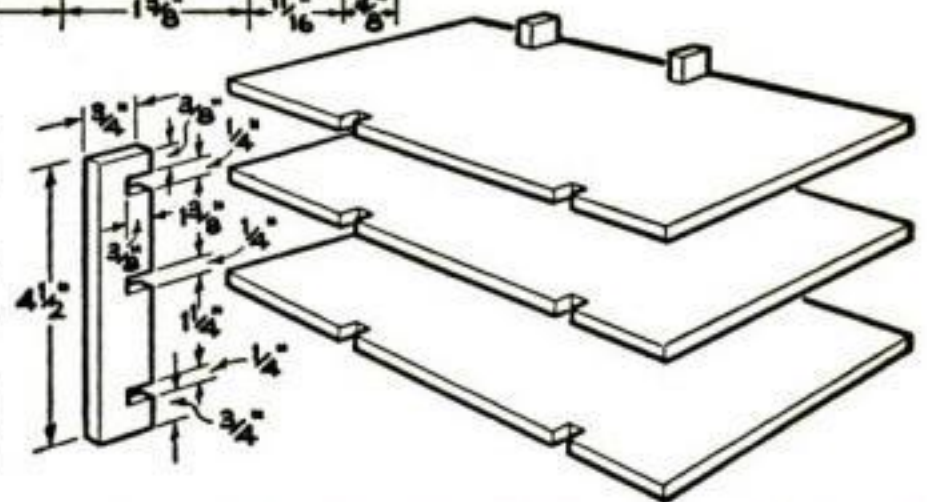
Locate the vertical dadoes on the side piece by holding them against this assembly. After cutting, add these sides, then the handle and top, and you have a lightweight tool box. You can quit here if that's all you want.

Doors that become legs. For more than a box, add the fold-down doors. To secure them when lowered, make two pairs of hasps from small strap hinges. Remove the hinge pins, screw the hinge halves in place, and insert a nail as a locking pin.

Screws for attaching the hinges, suitcase catches, and other hardware should be sized to fit the countersinks. Flathead 6-32 machine screws with flat washers and hex nuts, and #6- $\frac{7}{8}$ " flathead wood screws were used in the original. They're small, but show no sign of weakening after months of use. The chest handles are optional. I added them to the ends to make the box easier to haul out of a deep car trunk.

Fitting it out for tools. This is a matter of individual preference. If the box is to be used for permanent tool storage (it'll hold a small shopful), you can install racks tailored for specific tools. If it's to be used for carrying all types, equip it with universal holders.

I fitted mine with coil springs on hooks, a stack of leaf-type hold-downs, standard spring-steel clips, and the plywood rack, shown at right. So far, no tool has turned up that can't be carried undamaged and rattle-free.



DRILLED PLYWOOD RACK is independent of the tool box but is dimensioned to slip into an end pocket, between the glue blocks and the lengthwise partition. Lifted out, it's a tool stand.

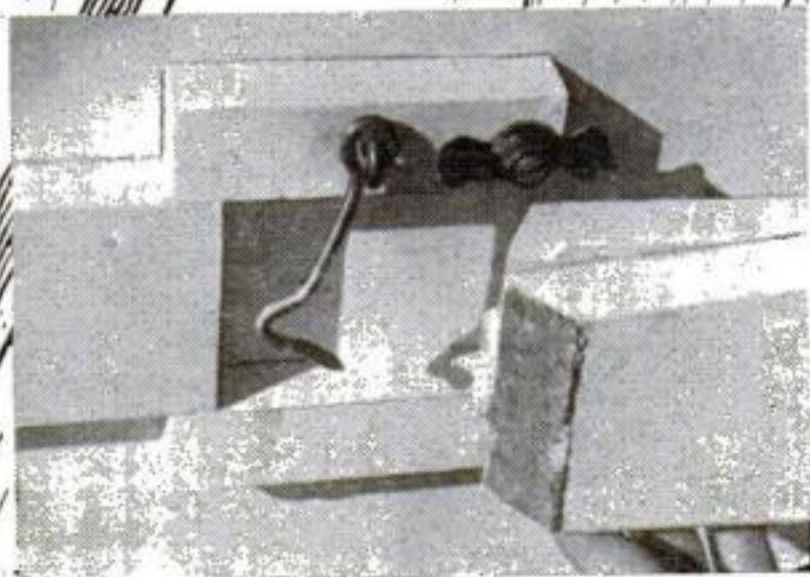
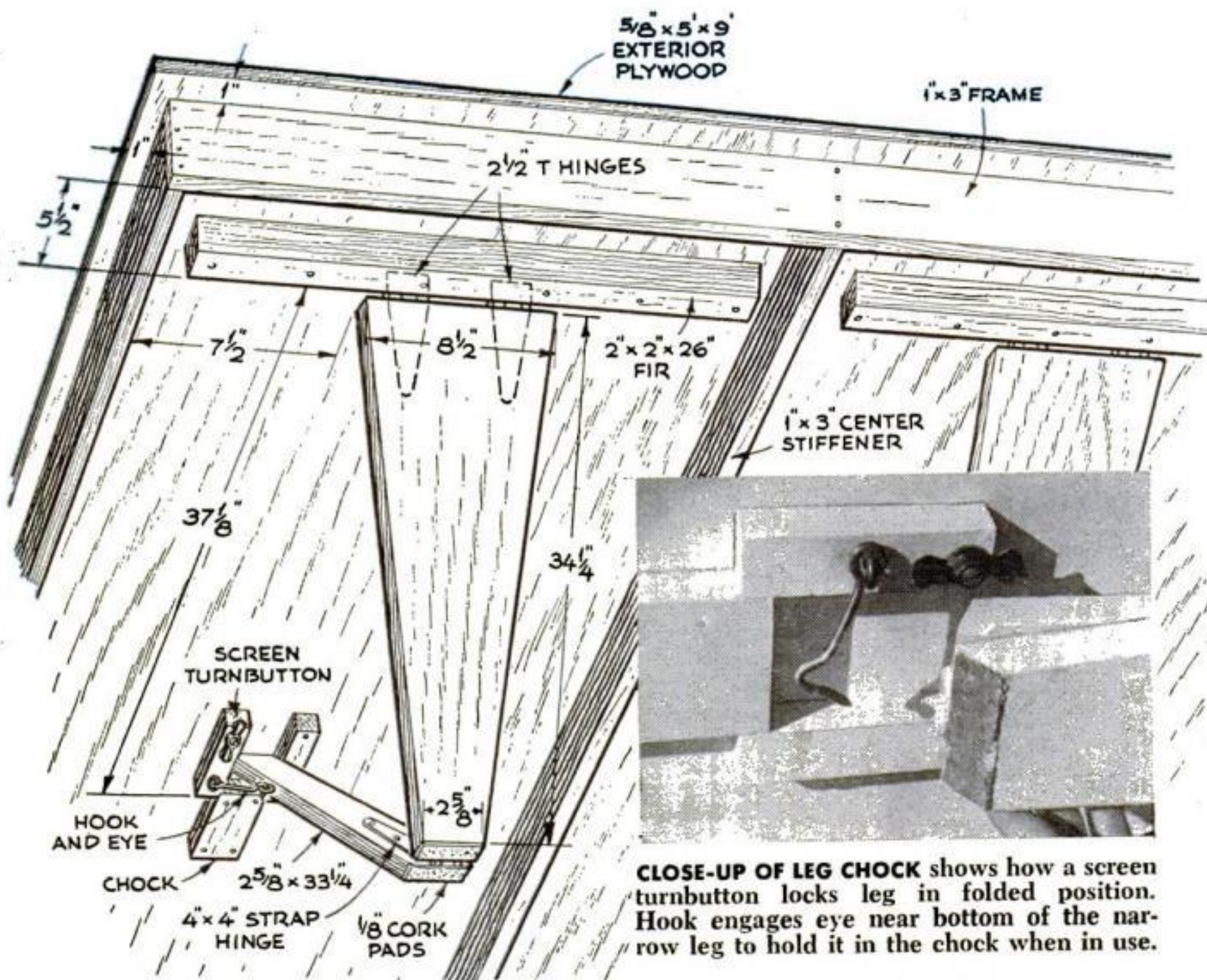
How I Store a Tennis Table



By Bob Gilmore

"WHERE in the house can I put a table that's big enough for model trains or table tennis?" One reply to this common question might be, "Fold it into the ceiling—there's plenty of room up there."

That's exactly what I did. After making the table, I built a frame of two-by-fours to fit around its



CLOSE-UP OF LEG CHOCK shows how a screen turnbutton locks leg in folded position. Hook engages eye near bottom of the narrow leg to hold it in the chock when in use.

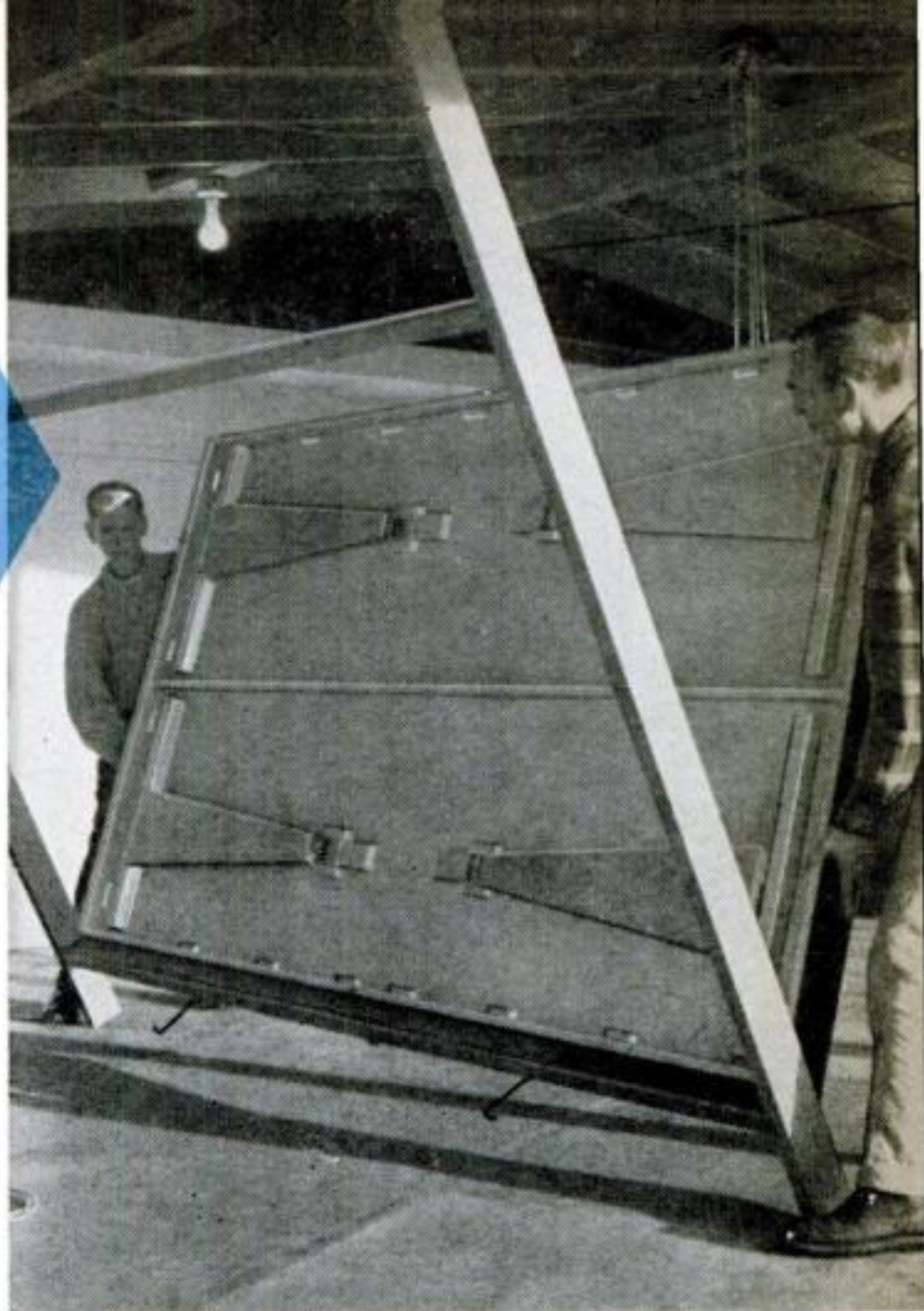
Overhead

sides. I hinged one end of the frame to the car-port rafters and rigged the other end with light block and tackle. To store the table, I lower the frame, place the table in it, and hoist away. For greater convenience, I could add a crank-driven winch.

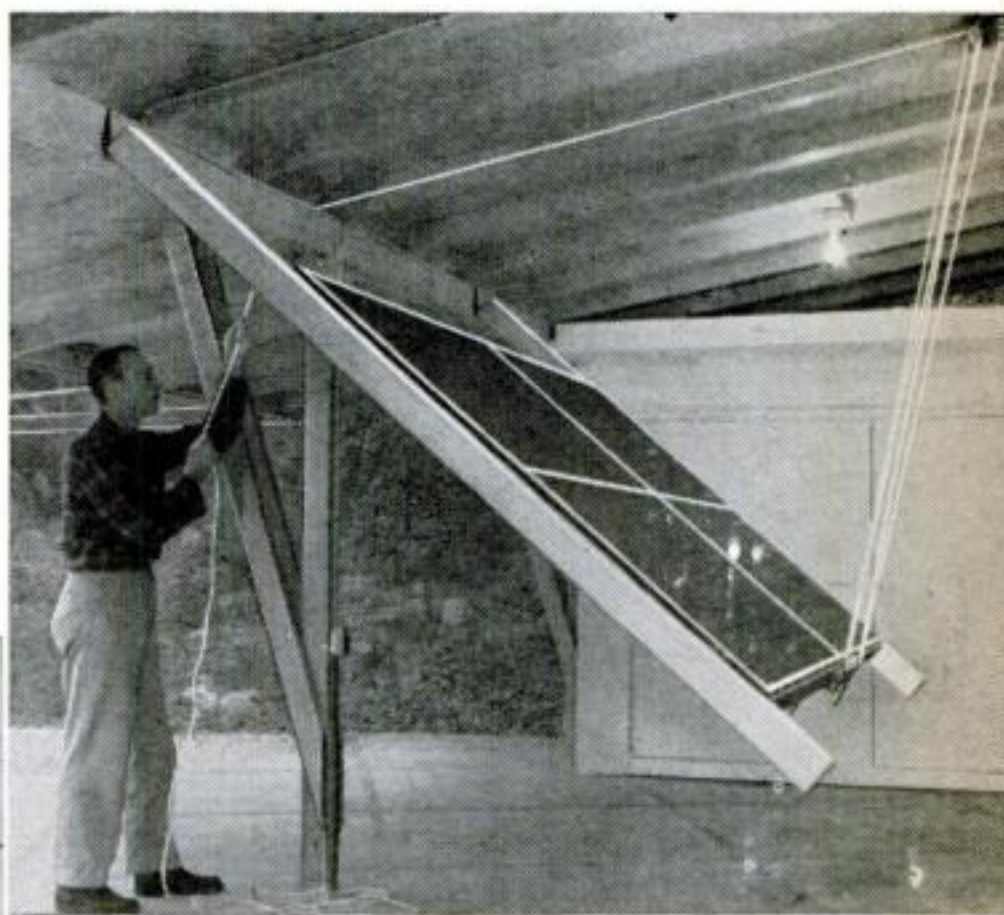
Where appearance doesn't count, this arrangement can be used in the rough, as mine is. But in a finished playroom, you can nail furring to the underside of the frame and cover it with tiles to match the surrounding ceiling. That way the frame would disappear like a concealed panel when raised into its opening.

Except for the unusually sturdy inverted-triangle legs, my table is standard for table tennis. The top is a 5'-by-9' panel of $\frac{5}{8}$ " exterior plywood, stiffened on the underside by a frame of one-by-threes set 1" in from the edges. A one-by-three fastened under the center of the table gives additional reinforcement. The legs, and the chock blocks the legs fit into, are $\frac{3}{4}$ " plywood. Heavy strap- and T-hinges make the folding legs rigid against end shocks, and the wide upper end of the taper resists side-sway.

Grain-taming resin sealer was used to coat the entire table. Two coats of green blackboard paint were applied to the edges and top to produce a tough, glare-free, nonskid surface for playing.



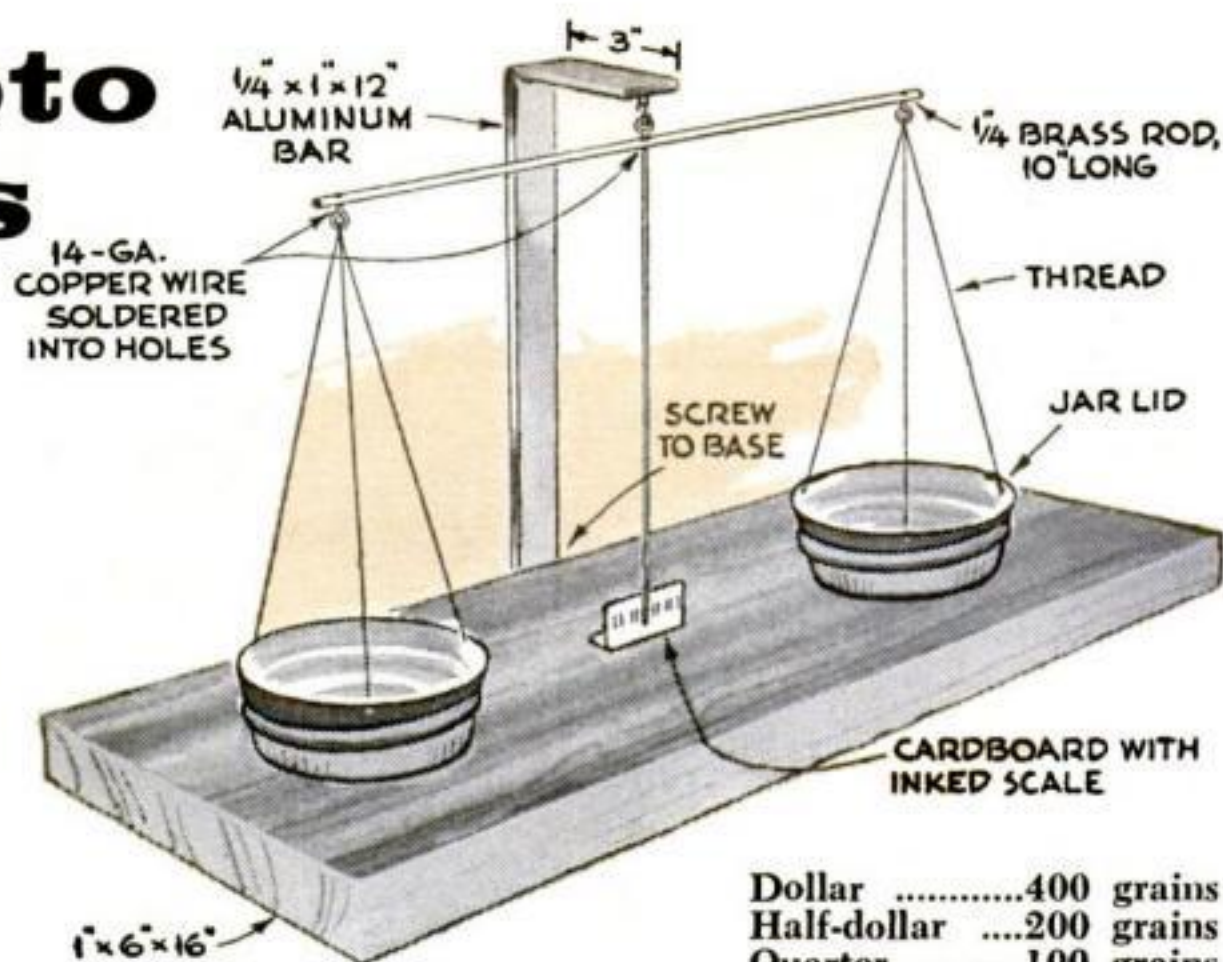
WHEN THE FUN'S OVER, fold up the legs and slip the table into its storage frame. The overhanging edges of the table top rest on the two-by-fours, which hold it flat against the ceiling.



HOIST AWAY, and up goes the storage frame with the table neatly cradled inside it. Two double-sheave pulleys and $\frac{1}{4}$ " Manila rope make up the easy-raising block and tackle.

IF YOU DON'T TRUST ROPE, lock the frame in place with two heavy hook-and-eye sets as an extra safeguard against accidental dropping. Note how legs fold flat against table.

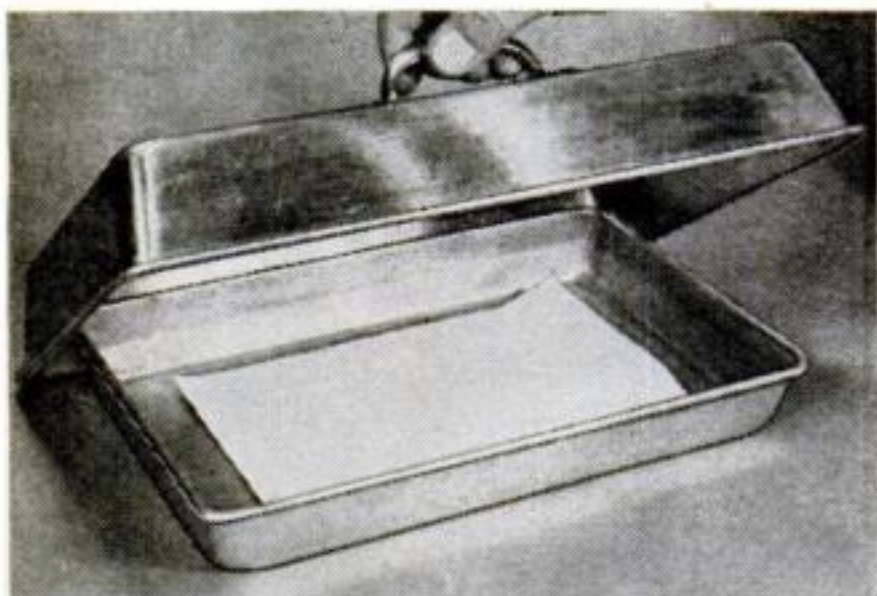
Photo Tips



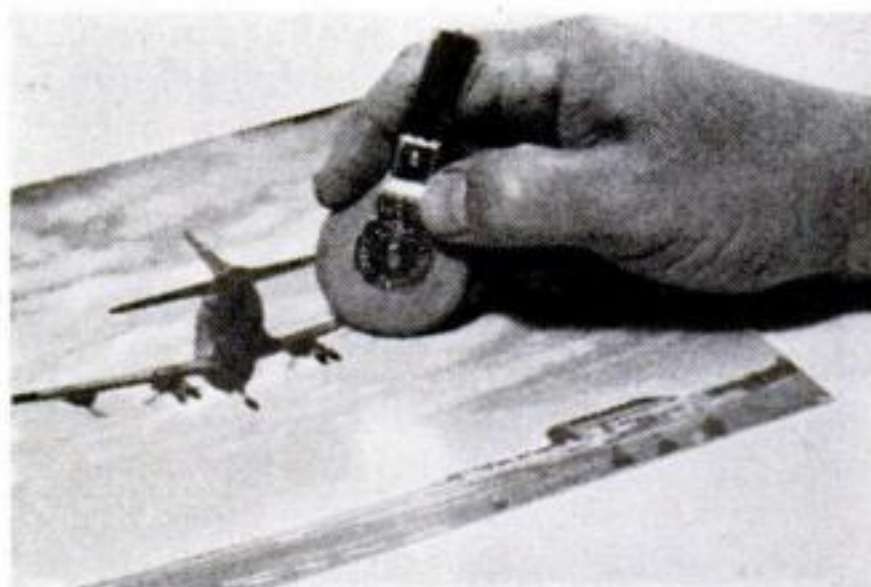
A PHOTO SCALE sensitive to one-half grain can be made from scrap. To level it, cement small pieces of wire beneath the higher lid until the beam is balanced and the pointer centered. New coins make accurate weights:

Dollar	.....400 grains or	26 grams
Half-dollar	....200 grains or	13 grams
Quarter	.....100 grains or	6.5 grams
Nickel	.....80 grains or	5 grams
Penny	.....50 grains or	3.25 grams
Dime	.....40 grains or	2.5 grams

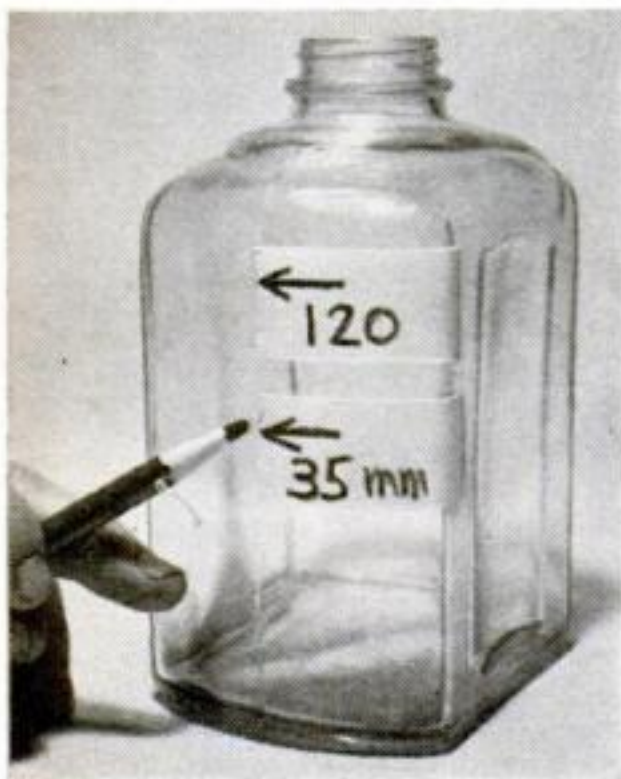
For smaller weights, section a 40-grain length of wire into 20-, 10-, 5-, and (five) 1-grain bits.



A CAKE TIN inverted over a smaller one on a darkroom shelf makes a light-tight paper container. Coat the inside with black paint. Bolt or rivet a sash pull to the top tin for easy lifting.



ROUGHEN GLOSSY PRINTS lightly with a typewriter eraser in spots where minor retouching is required. An ordinary lead pencil can then be used successfully for the touch-up job.



CARRY RUBBER BANDS in your gadget bag to keep exposed roll film from uncoiling. Gummed tabs often pop off, letting the film become light-fogged.

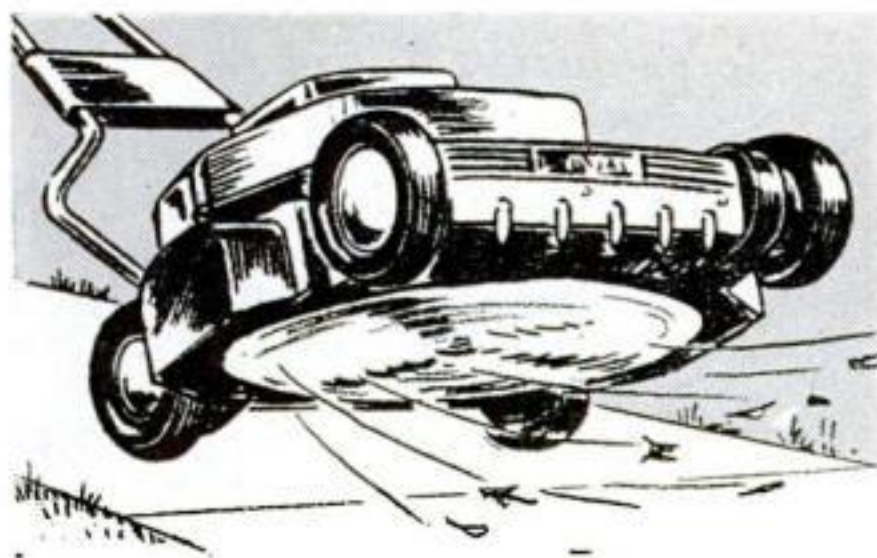
CALIBRATE A BOTTLE to gauge correct quantities of processing solutions for the various films you develop in a single-roll tank. You'll avoid wasteful spillovers. Waterproof adhesive tape marked with a grease pencil withstands repeated washings.





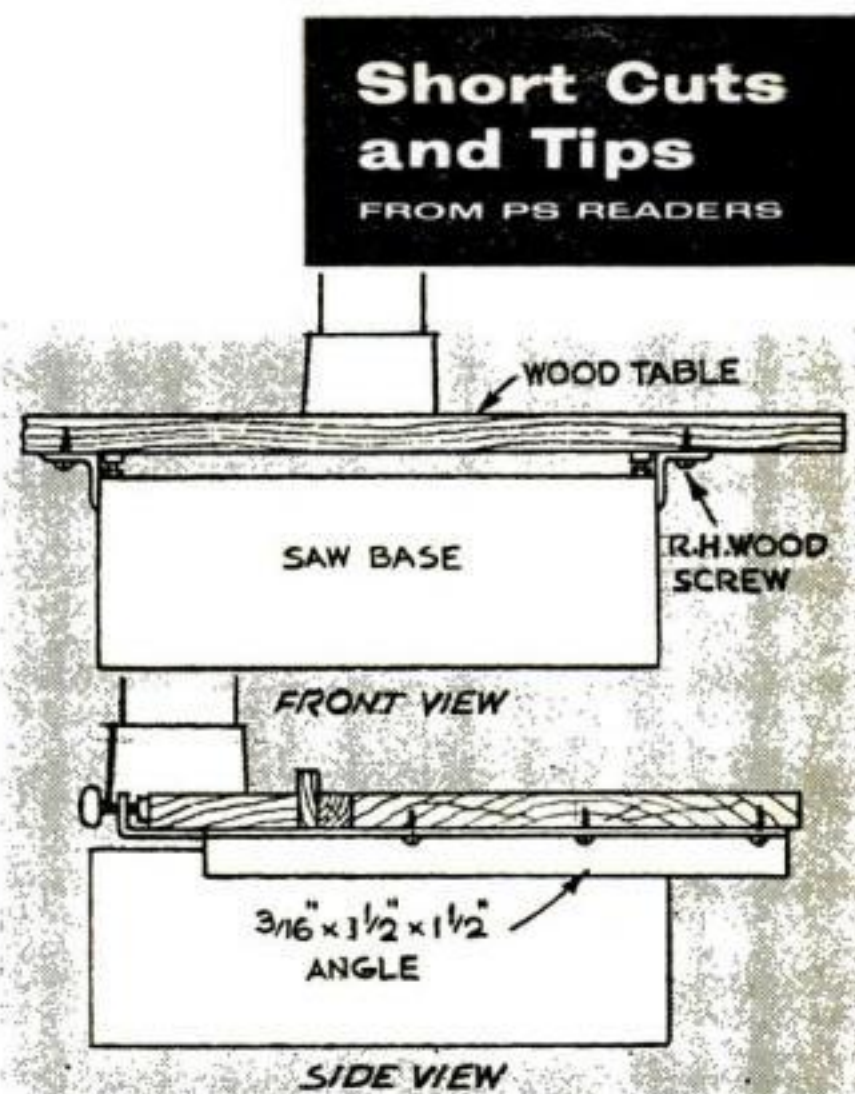
Clothes-Closet Paint Guard

IN SHALLOW closets, the sleeves of clothing on hangers often protrude into the door frame. To avoid emptying the closet when repainting the jambs, slip a wood slat inside the frame to hold the sleeves back out of the way. Two brads and a few taps with a hammer will keep the slat in place while you paint.—A. V. Deltuva, East Meadow, N. Y.



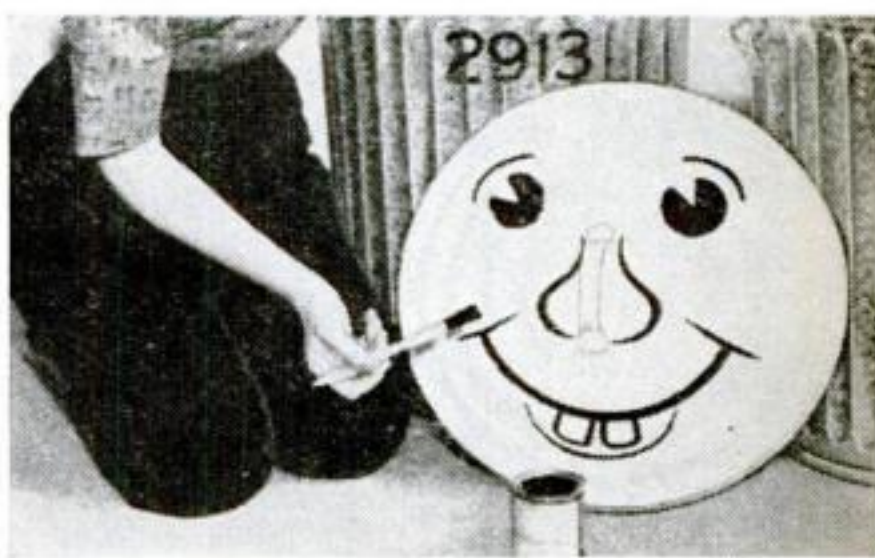
Mower Cleans Sidewalk

MOST rotary mowers strew grass clippings over bordering walks and paths. Rough sidewalks and stepping stones are hard to sweep, but you can make the mower clean up after itself. Tip it back so that the front is 6" to 8" off the ground and push it along the walk on its rear wheels. The revolving blade acts as a fan and blows all debris off the surface.—A. D. Allen, Plainfield, Ind.



Unwarping a Saw Table

BASEMENT dampness caused the wood table of my radial saw to warp so that I couldn't make a cut of uniform depth. I flattened the table by screwing two lengths of angle iron to the underside, as shown. Then I adjusted the table—following the instructions furnished with the saw—to make sure it paralleled the arm.—Roy Vigna, Caseyville, Ill.



Garbage-Can Cartoons

BRIGHTEN your collector's rounds by painting a face on the lid of your garbage can. You can bet he'll replace it on the right can. Your house number on the can will also prevent mixups.

▶▶▶TROUBLE starting your power mower these cool autumn days? Borrow your wife's hair dryer and train it on the cylinder fins.—Harry Knight, NYC.



FOR FINISHING PLYWOOD EDGES, epoxy putty forms chip-proof surface that sands smoothly and takes paint beautifully. Homemade putty is resin mixed with wood flour (made on sanding disk).

The **GOO** with a **Million Uses**

Fix anything? Sure—with epoxy

By John Burroughs

EPOXY resin is catching on fast, and deservedly so. For my money, it's the most useful goo ever stirred by a stick.

I had my first look at this marvelous stuff a couple of years ago in a pattern shop. I'd admired a well-finished foundry pattern that seemed to be made of aluminum. But it wasn't solid metal, the patternmaker told me. He'd used a new "pattern compound"—glass-fiber-reinforced, powdered-metal-filled epoxy resin. He was enthusiastic about the stuff. Very easy to use, he said. He was through carving patterns from mahogany.

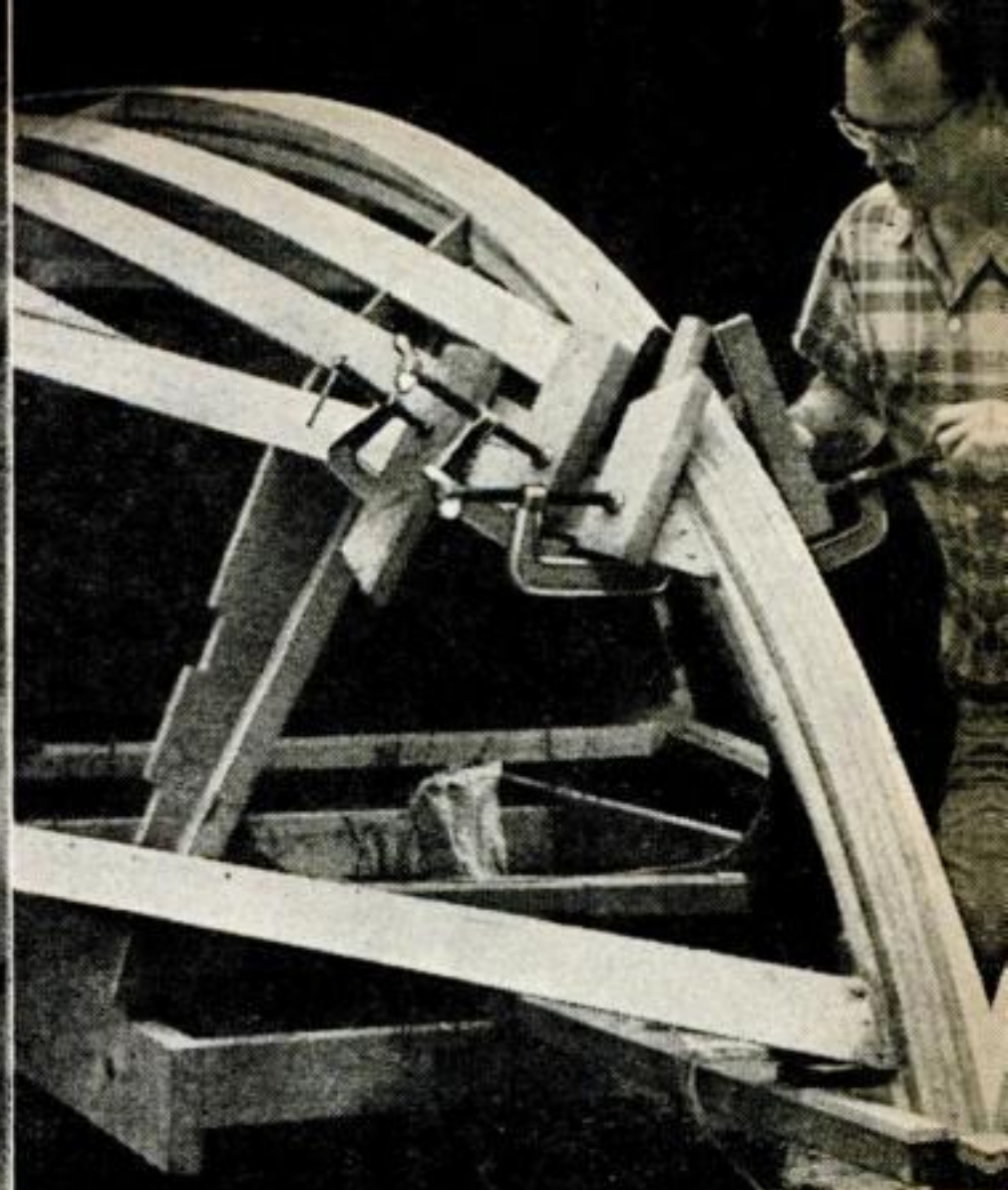
I bought a can. And since that day I've used epoxy in one way or another for most of the shop and home-maintenance jobs I've tackled.

For epoxy has turned out to be by far the best general-purpose shop cement—and wood filler, rustproofer, leak stopper, cold solder, glass adhesive, concrete

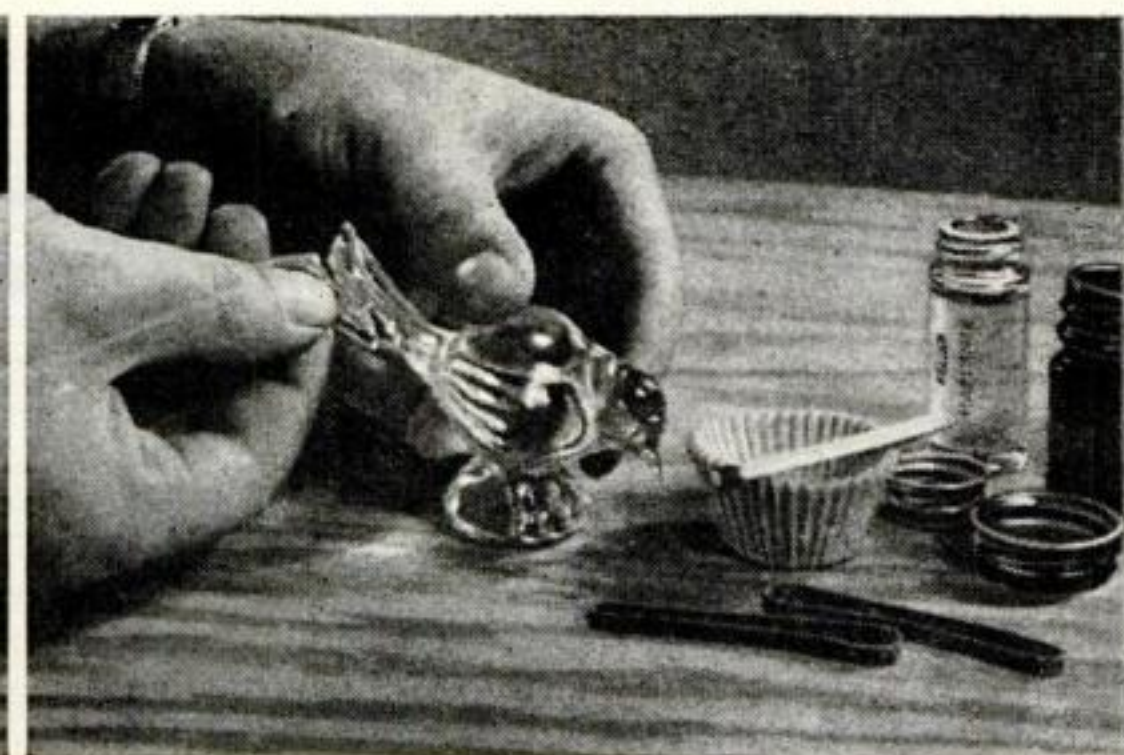
CONTINUED



CEMENT METAL TO GLASS PERMANENTLY with epoxy resin. Rubber bands hold this label—a tin name plate snipped from a chemical can—in position until the resin cures completely.

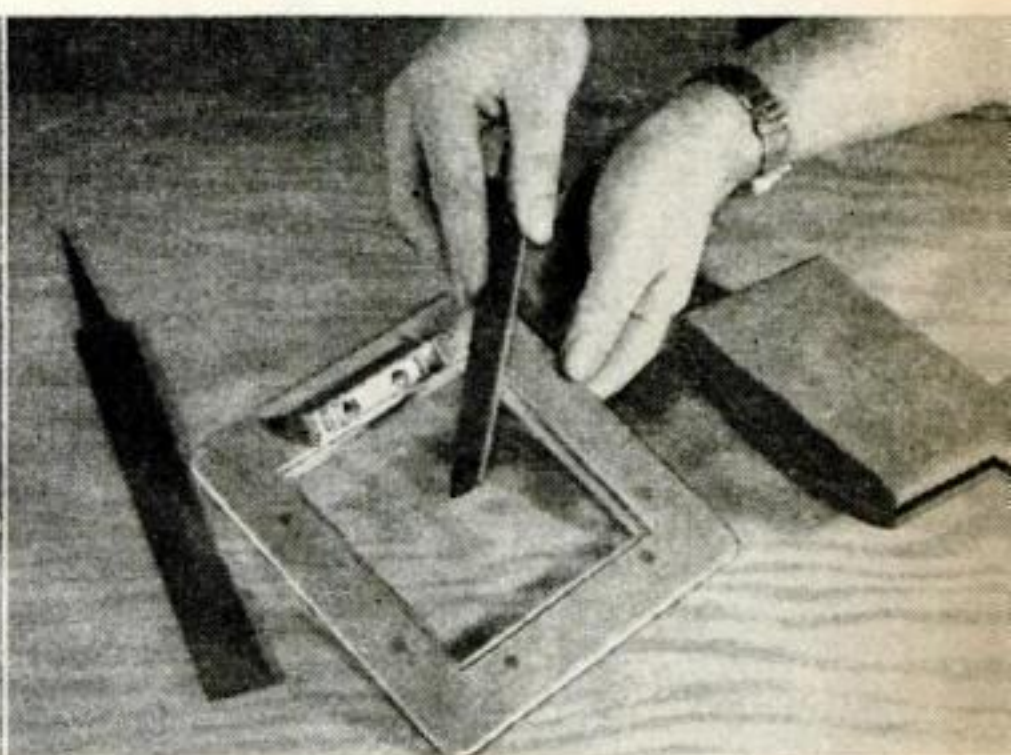


BOAT JOINTS are shown here held by the super-powerful adhesive. Epoxy resin is preferred for laminated stems, chine beds, and the joints between longitudinals and the stem.



FOR MENDING BROKEN GLASSWARE, epoxy is much stronger and more satisfactory than any volatile-solvent cement. Break in the tail of this crystal bird was invisible after the repair.

QUICKLY MADE ABRASIVE TOOL is circular-saw sanding disk brushed with resin and sprinkled with coarse grit. Use aluminum oxide to work metal, silicon carbide for other materials.



HOME-BREW COLD SOLDER—epoxy filled with powdered aluminum—assembles or repairs aluminum parts. Lens-adaptor frame (above) was built up by cementing thin aluminum plates.

SET FLOORING NAILS FOR GOOD when renailing hardwood or underlayment. Coat the nails with epoxy and drip a drop into the pilot hole. Don't wait too long before setting the heads.

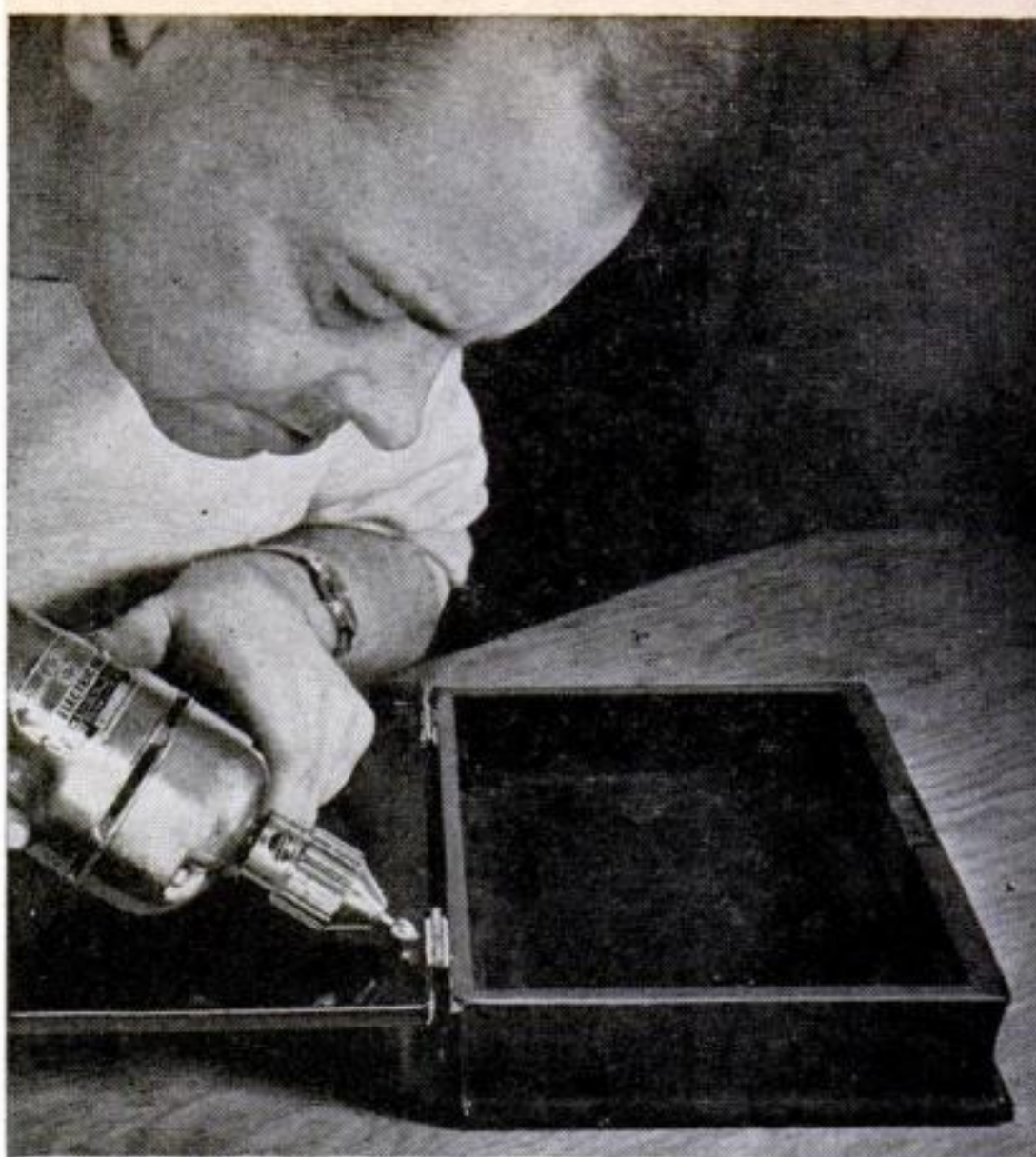


patcher, and cracked-plaster-wall-fixer-upper—I have ever used.

What is it? Epoxy looks like ordinary polyester resin, a sticky syrup with separate hardening agent. And it handles similarly. But epoxy beats polyester on two counts. It sticks like fury—to wood, metal, glass, ceramic, almost anything. And it's unbelievably tough.

The stuff is a wonderful adhesive. Epoxy wets a surface like a detergent, then cures in place. When cured, it's unaffected by water, oil, or any common solvent. It withstands heat to 250 degrees plus. And that's not all. It's also a matchless vehicle for mixing up an endless assortment of nonshrinking, putty-like filler materials.

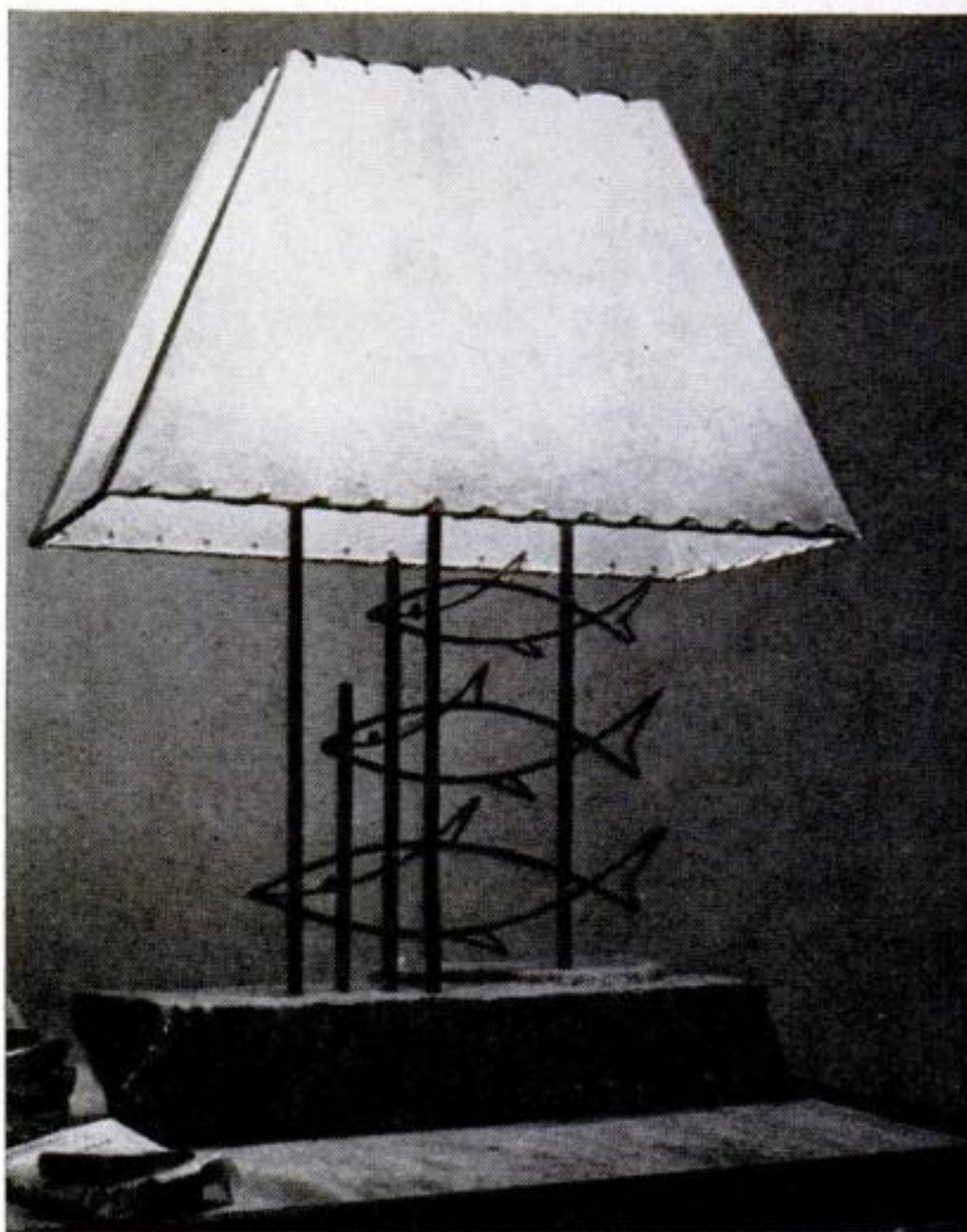
To make various fillers, I've mixed in powdered aluminum and bronze (sold in paint stores), fine-grit abrasives (dry rouge, aluminum oxide, silicon carbide),

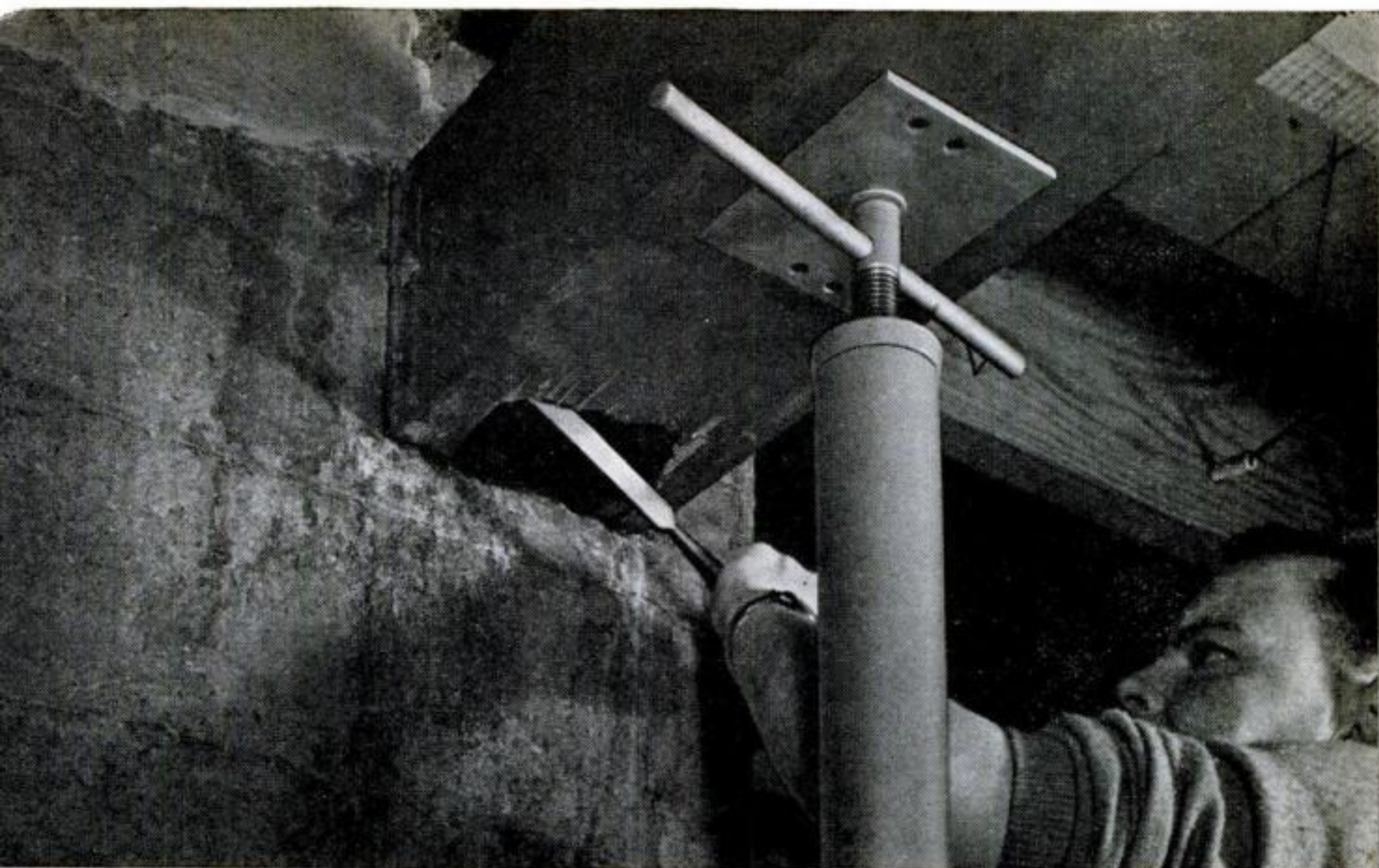


LOOSE HINGES on boxes and cabinets are reset to stay permanently with metal-filled epoxy. You can smooth the resin compound—after it has cured thoroughly—with a rotary file.



RUDDER FOR SLOOP was laminated of four layers of $\frac{1}{2}$ " plywood, using epoxy resin. Slots for the shaft were sawed in the inner two layers, and the shaft embedded in epoxy putty. The rudder was sanded to a teardrop contour and overlaid with epoxy-saturated fiber-glass.



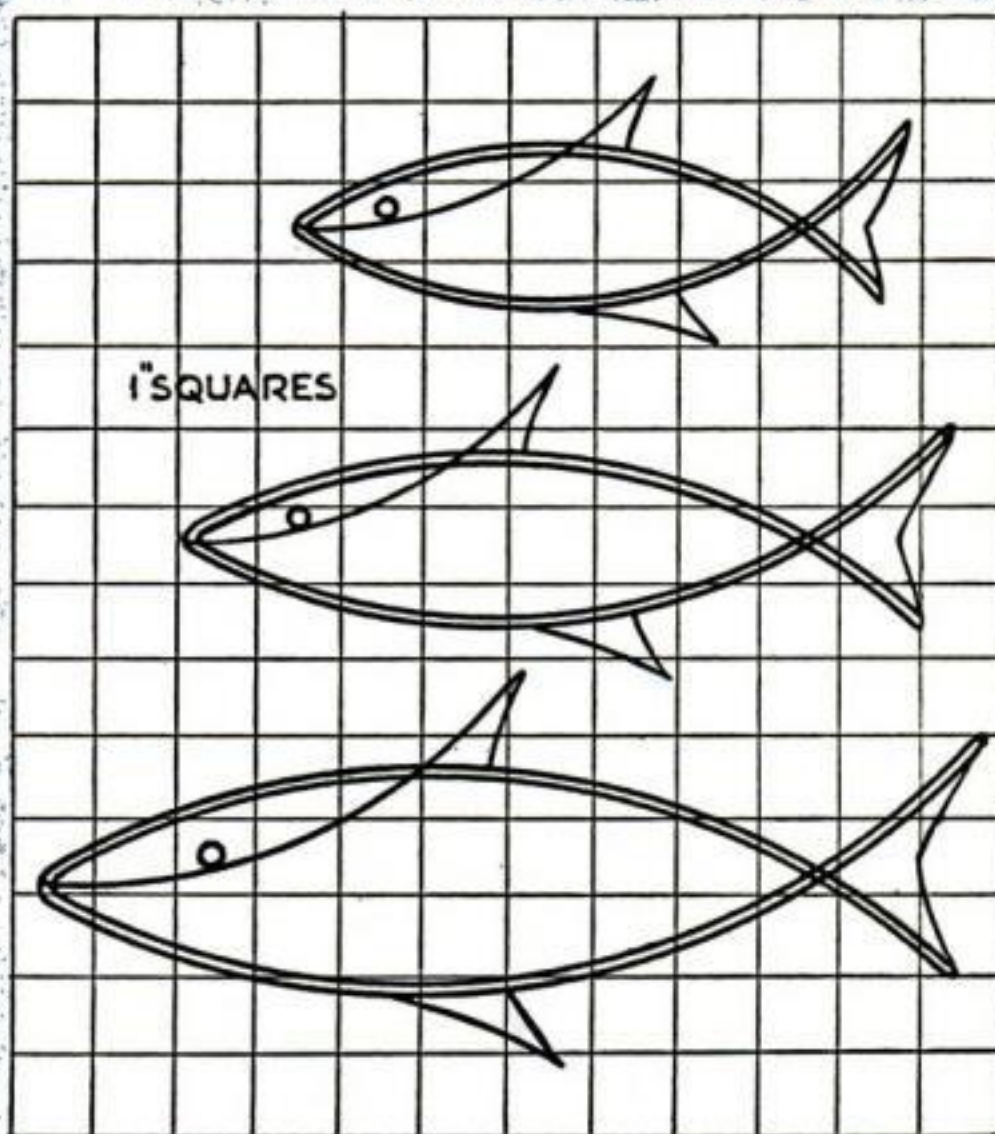


FIXING ROTTED TIMBER is another job for epoxy. After the decay pocket was chiseled out of this beam, the cavity was painted with epoxy and

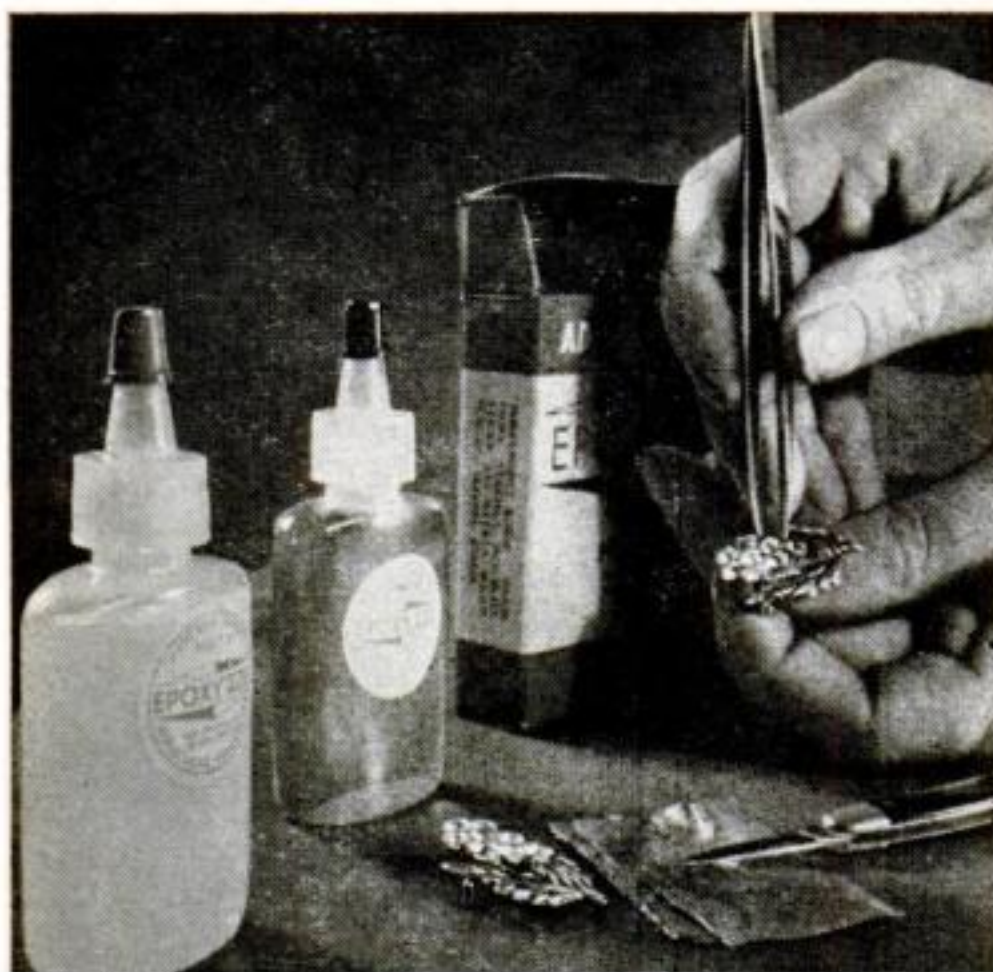
packed with a filler made of one part resin (by volume), two parts fine sawdust, and three parts coarse sawdust (or wood chips).



CRAFT PROJECTS, too, make good use of epoxy. For this table lamp, brazing took care of the steel-rod fish. Epoxy cement held the assembly



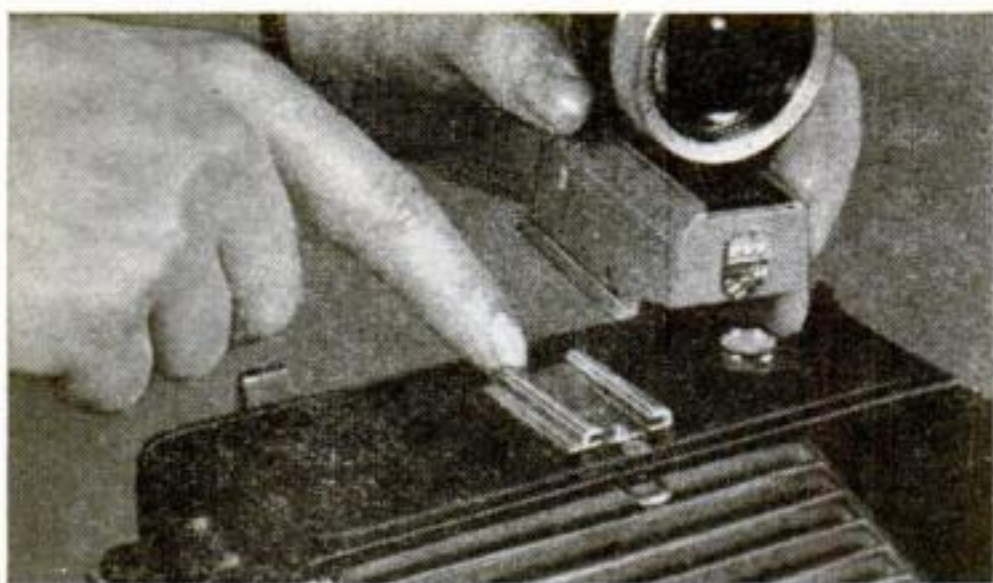
in holes in the fieldstone-slab base. The holes were drilled with a carbide-tipped masonry bit. Center upright is tubing for wire.



REPAIRING JEWELRY AT HOME is simple with epoxy cement. To prepare small quantities, drip drops of resin and hardener onto a square of aluminum foil (edges folded up) and mix chemicals with knife tip.



HARDWARE HOLDS ON A PLASTER WALL if you use epoxy resin filled with fine aluminum oxide. Roughen the back of the bracket with a file, then apply the cement to both the bracket and its mounting screws.



AS GOOD AS SCREWS—and much easier—metal-filled resin was used to attach this view-finder mount to a camera. It will hold permanently. Epoxy is handy stuff for assembling all kinds of small parts.

fire clay, portland cement, chalk (whiting), sand, wood dust, milled glass-fibers, shredded asbestos. Any greasefree, reasonably dry material makes a satisfactory filler.

How to use it. Shop-mixing your own epoxy compounds takes experimentation, since resin formulations vary. Some epoxy blends cure very hard. Others are tougher, with better adhesion. Mix a sample batch to check the result before using an untried filler on an important job.

Be sure to mix resin and hardener, and filler if any, thoroughly. Mixing, however, whips in minute air bubbles that turn the resin whitish, or cloudy. If you're using the epoxy as an adhesive, it's a good idea to warm the resin to about 150 degrees. This lowers its viscosity and brings the bubbles to the surface. Heating also improves penetration with wood or other porous materials.

Because grease or moisture can inhibit the chemical reaction that polymerizes epoxy, see to it that surfaces to be cemented are scrupulously clean. Curing time will vary considerably with temperature. Most epoxies harden in about 20 minutes when warmed to about 200 degrees with a heat lamp. When warmed to 100, curing takes about 2 hours; on a warm day with the air at 75 degrees, 12 hours; when the temperature is 65, 5 days.

Straight epoxy (unfilled), is sold in bulk for laminating, waterproofing masonry, patternmaking, repairing auto bodies, patching boats, and other uses. For general-purpose cementing and for mixing small quantities of various fillers, I like straight resin.

When you need a sizable quantity of powdered-metal or glass-fiber-filled epoxy, it's wiser to buy a commercial epoxy-based product with filler already added. There are many such putties on the market, and all I've used are wonderful.

Epoxy's fairly expensive. A pint costs about \$5. But a little resin goes a long way when you extend it with filler. And anyhow, the result is worth it.

Short Cuts and Tips

FROM PS READERS

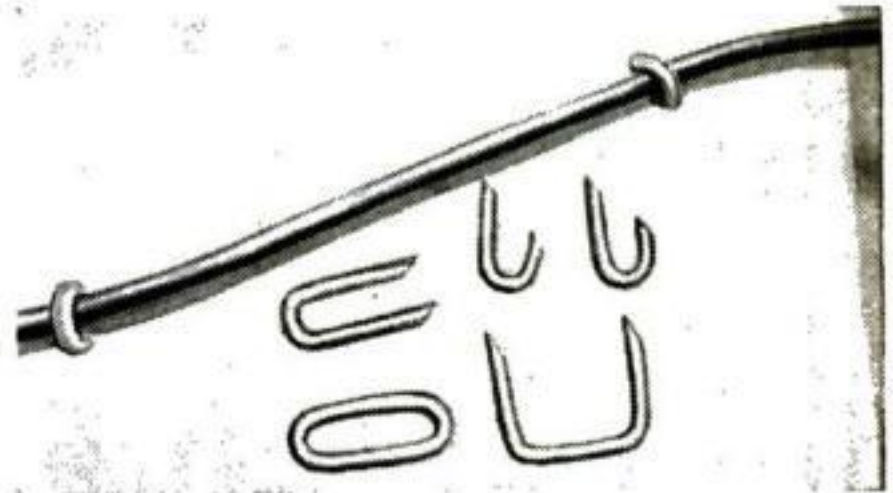


Nameplate Shadow

You get double duty from an outside name-and-number plate if you cut it from aluminum sheet and suspend it like this. On sunny days its shadow shows on the wall behind.—*Max Tatch, Hollywood.*

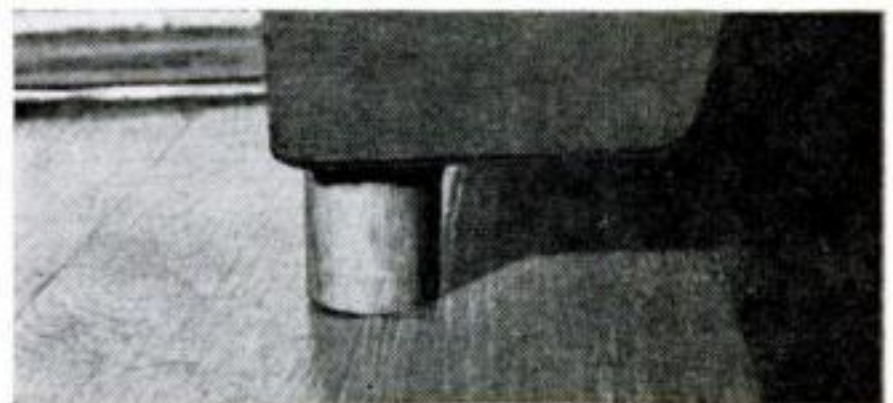
Furniture-Leg Extension

DON'T use unsightly blocks to level furniture on uneven floors. Instead, cut a neat extension for the short leg from a mop or broom handle and stain it to match. Attach with a wood screw and cover the screw with a furniture glide.—*Wayne Floyd, Fayetteville, Tenn.*



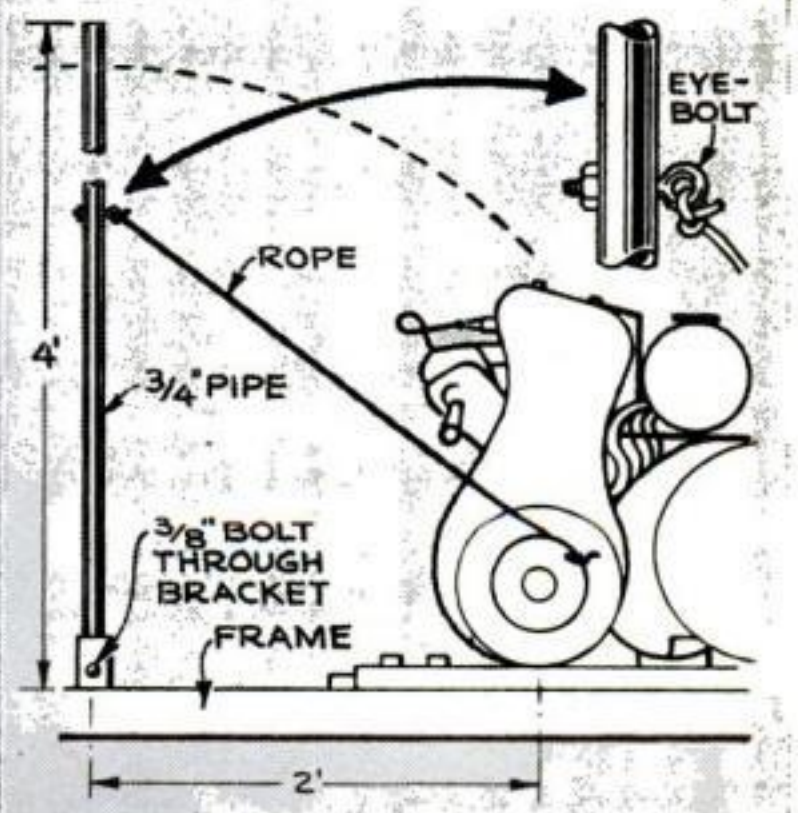
Staples from Tire Chain

DISCARDED tire chains are a good source for heavy-duty staples. Cut at a 45-degree angle for easy driving, the links offer a variety of sizes and shapes.—*John Mihalick, E. Liverpool, Ohio.*



Starter Handle for Engine

A PIVOTING handle provides a safe, convenient way of pulling a rope to start a small engine. I mount the engine on a frame of angle iron and locate the handle



pivot 2' from the center of the motor pulley (sketch above). With the rope adjusted for length and tied to an eyebolt on the handle, I just pull the handle to start the engine.—*Donavan Lathrop, Saguaro National Monument, Ariz.*

How to Use Wheels to Save Your Back

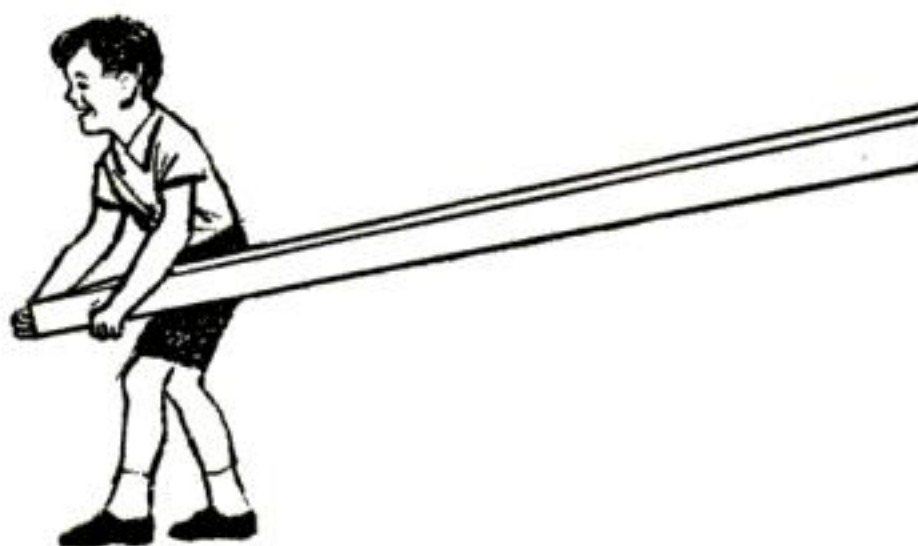
These tricks with rolling stock are guaranteed to ease many backbreaking jobs in home and shop

By Darrell Huff

Extra help from a WHEELBARROW

Suppose you have a stack of timbers, each weighing 200 pounds, to move from one end of your driveway to the other—but they're far too long to balance on a wheelbarrow. Use a wheelbarrow anyway, drafting a small boy as outrigger. He'll keep the load balanced as you roll along.

Heavy stones or paving blocks, though easy to wheel, are backbreaking to lift. A simple solution: Lower the rear of the wheelbarrow by blocking up the wheel. When loading a barrel, drum, keg, or anything else that will roll, go a step further: Add a ramp in the form of a plank or piece of heavy plywood—and roll it on.



A MOVING MAN'S best friend



A hand truck is your best bet for wrestling such heavies as refrigerators and trunks, but what about a potted plant or a small tree growing in a box? Low or plump shapes like these are hard to handle on an ordinary hand truck with its short loading platform.

So fatten that surface with a temporary extension—a sizable square of plywood bolted on securely.

For heavy-duty hauling, a permanent setup is better yet. A heavy strap-steel extension, preferably welded on, can handle almost any odd-shaped load, and the hand truck remains useful for toting conventional cargo.

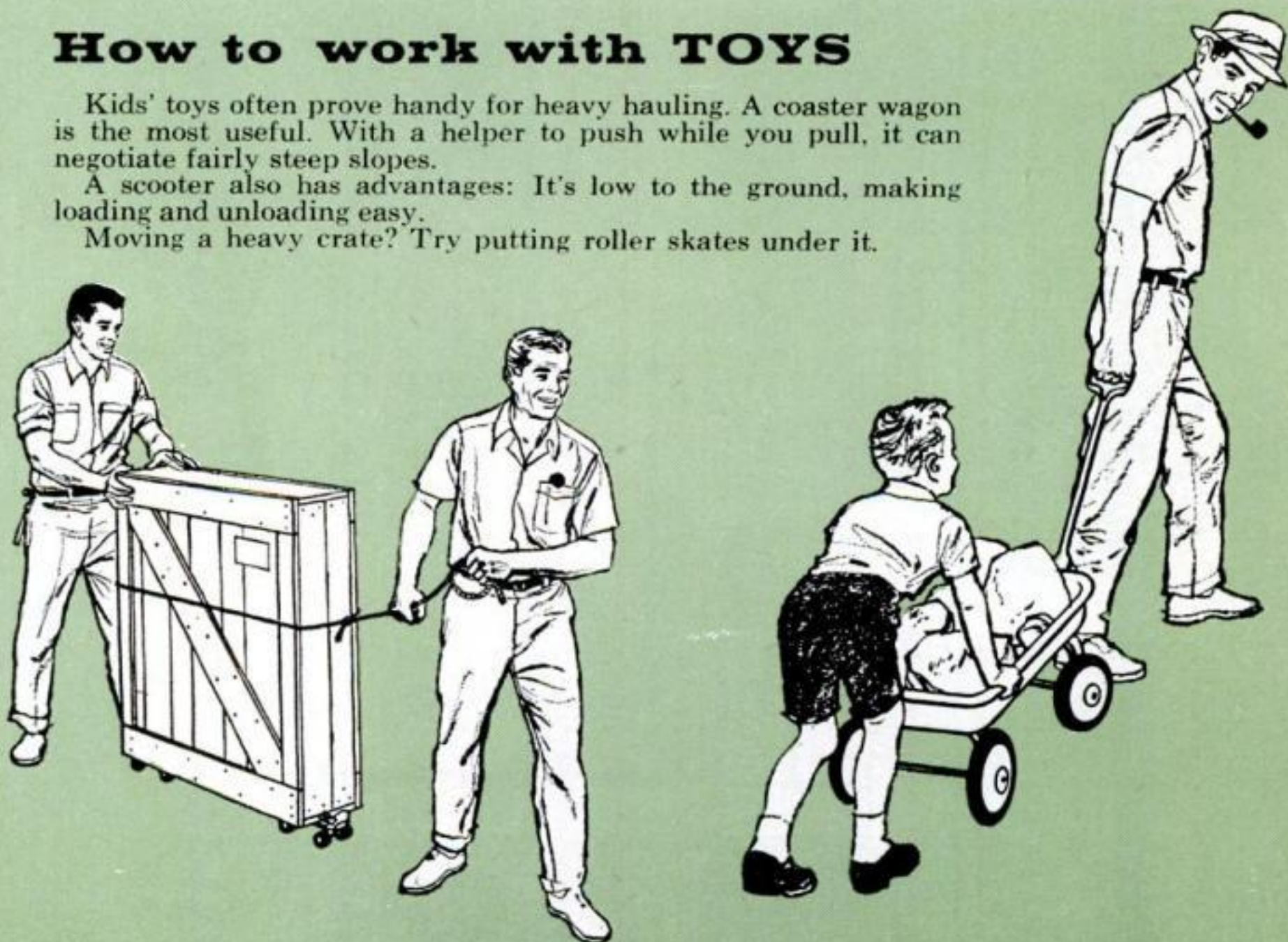


How to work with TOYS

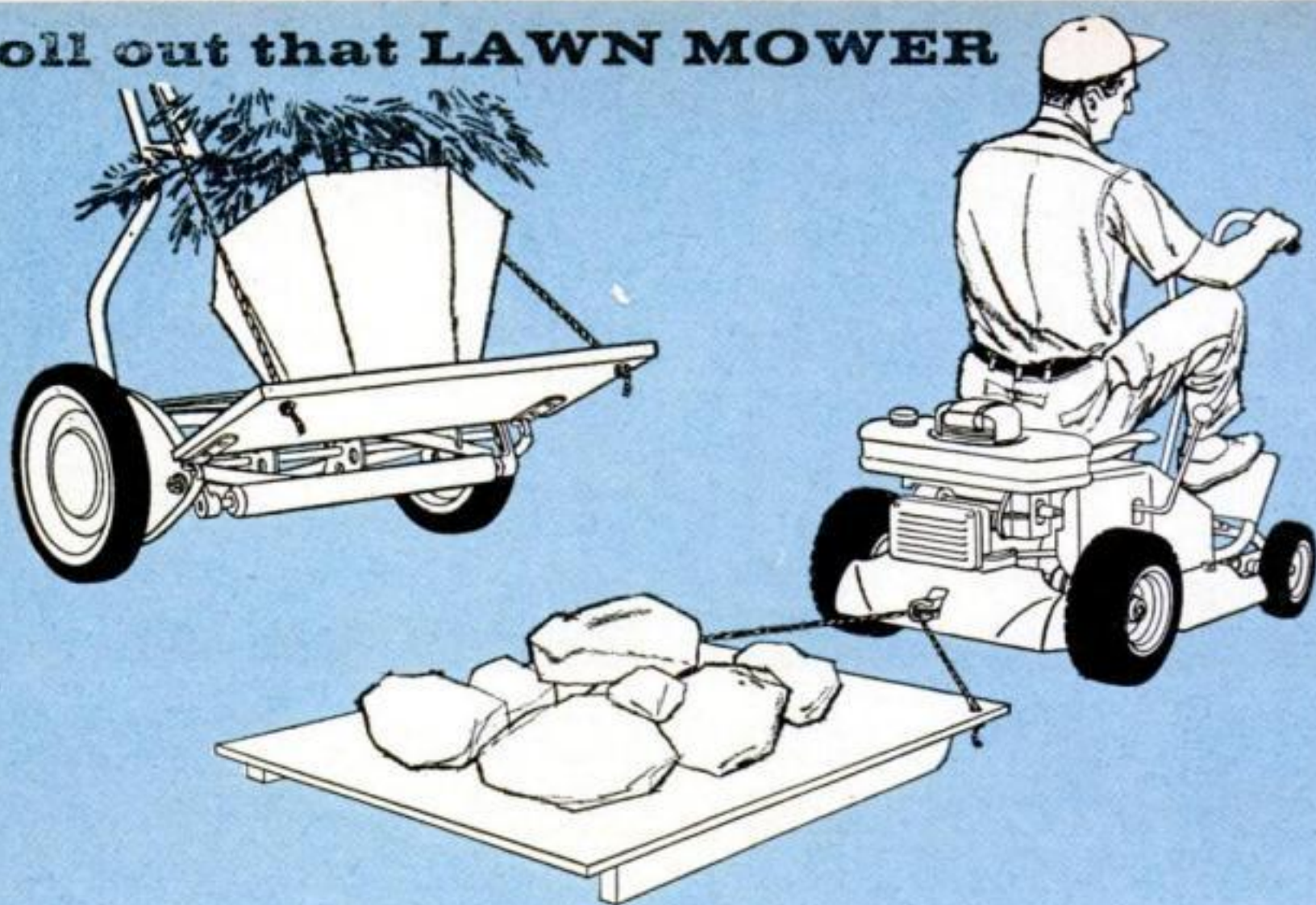
Kids' toys often prove handy for heavy hauling. A coaster wagon is the most useful. With a helper to push while you pull, it can negotiate fairly steep slopes.

A scooter also has advantages: It's low to the ground, making loading and unloading easy.

Moving a heavy crate? Try putting roller skates under it.



Roll out that **LAWN MOWER**



A lawn mower has moving potentialities you may not have thought of. Turn over a hand mower so that the drive cogs do not engage as you push it, and you have a ready-made means of transporting various objects short distances.

You can easily make an adaptor to turn the mower into a hand truck. Cut a square of plywood a few inches wider than the mower. To secure the two rear corners to the grass-catcher hooks, bolt on S hooks, available in hardware stores, or short pieces of strap iron drilled for mounting. Drill the other two corners of the plywood

and run ropes to the ends of the handle.

A power mower, especially one that you ride, can be equipped with a variety of accessory-hauling attachments. If you don't have such an attachment, try towing a child's coaster wagon or a homemade version of the old New England stone boat—a sturdy, low wooden sled. Plywood or planks cleated together can be used for the top of the boat. Runners can be shaped from two-by-fours or heavier lumber, depending on the ruggedness of the work to be done and the durability you wish to build in to your stone boat.



Rolling on **PIPE**

Four or five pieces of pipe are a good emergency answer to many heavy moving problems. Lift the object onto three of them, then roll it over the fourth. Each time a pipe is cleared, move it to front position. Large-diameter pipe is best, but small water pipe will do the job, too.

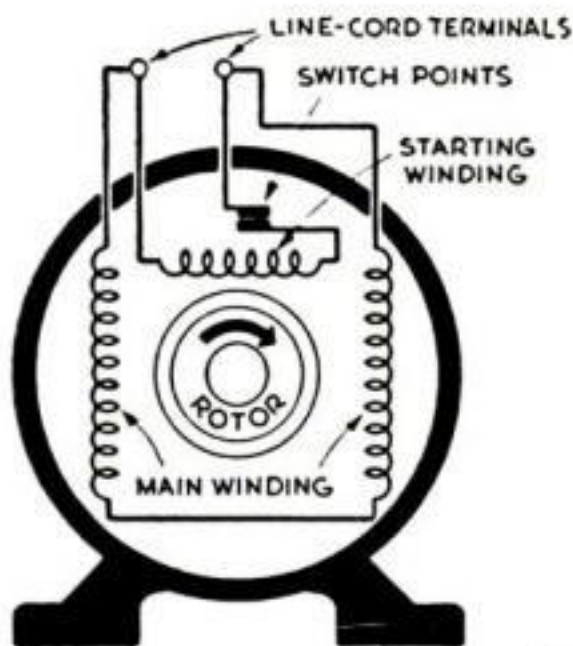
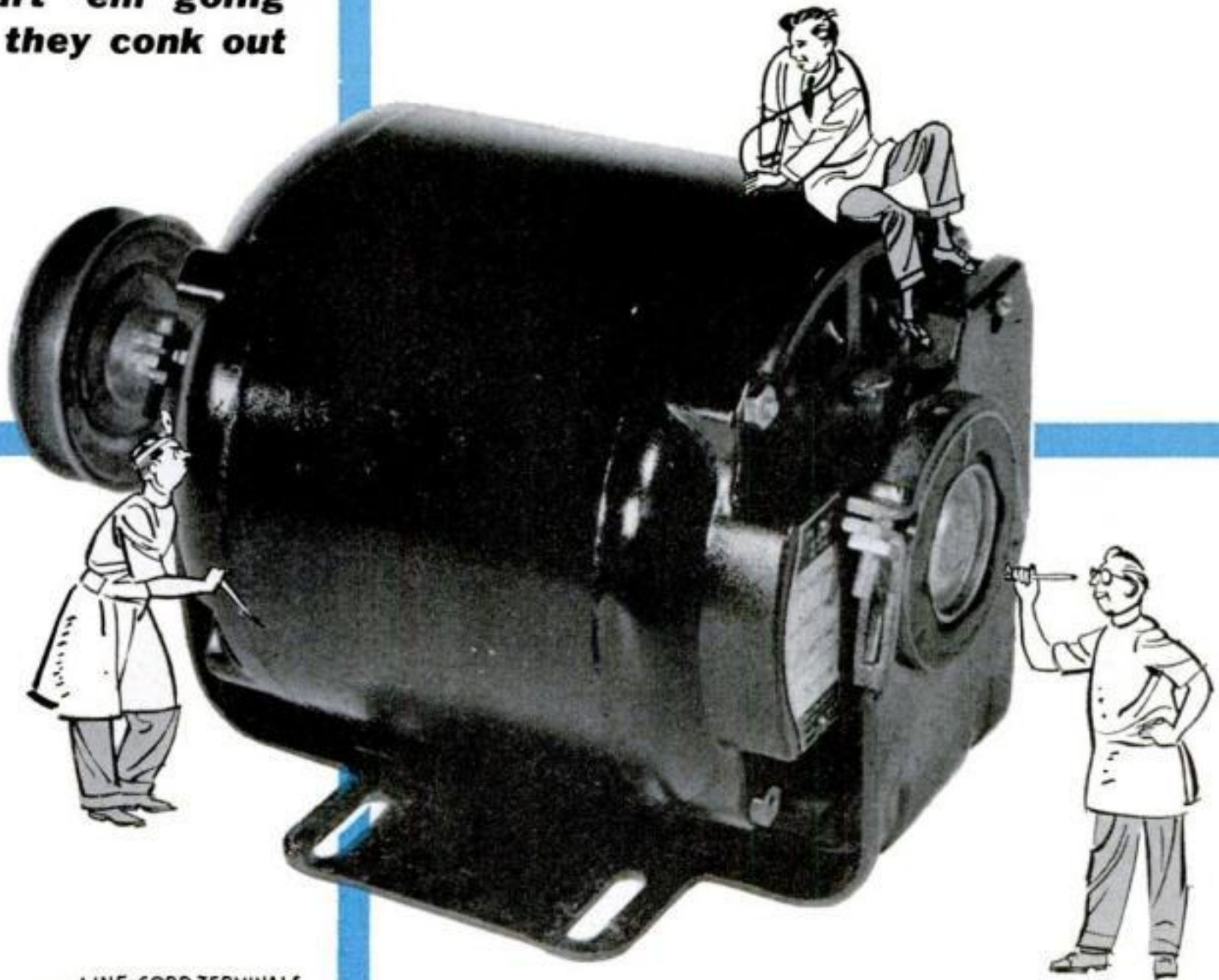
When crossing a lawn or rough ground, roll the pipes over planks.

PS Favorite

This article, readers' choice for rerun of the month, originally appeared in January '55 PS. Judging from many letters we've received, it's as timely today as it was five years ago. Have you an old favorite you would like us to repeat? If so, send in your vote.

Sure Cures for Ailing Shop Motors

There's no mystery to trouble-shooting these shop helpers. Here's what you do to start 'em going when they conk out



WIRING DIAGRAM for a split-phase motor. In actual practice both windings have a number of coils. The starting winding is cut out when the motor comes up to speed and centrifugal force opens the switch. To reverse such a motor, switch leads to either winding, but not both.

By J. W. Rocke Jr.

MIKE'S shop was closed, but he was in and opened the door for me. Inside, I set down the electric motor I had lugged along.

"It just sits and hums. Hate to bother you on a Saturday, but I can't run my lathe without it. Your wife said you wouldn't mind—"

Mike Evans grinned. "Think I've forgotten how you started my car after that cloudburst? Glad to help."

I kicked the black brute on the floor. "Best motor in my shop, but it picks today to quit on me, just when I have a weekend to finish that HO locomotive. Think you can save it?"

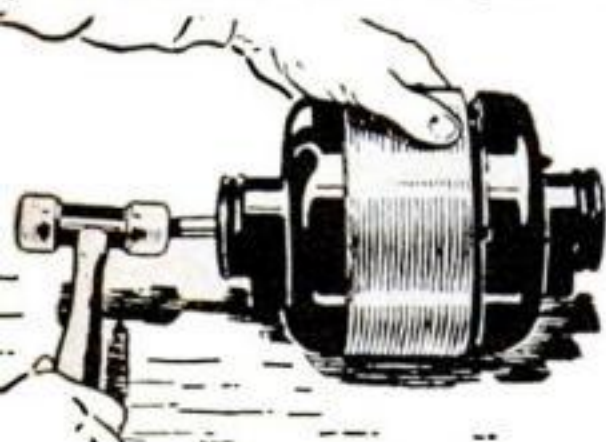
"Let's see," said Mike. "Bring it here."

I toted the motor to his workbench and he plugged it in. But it didn't work for him, either.

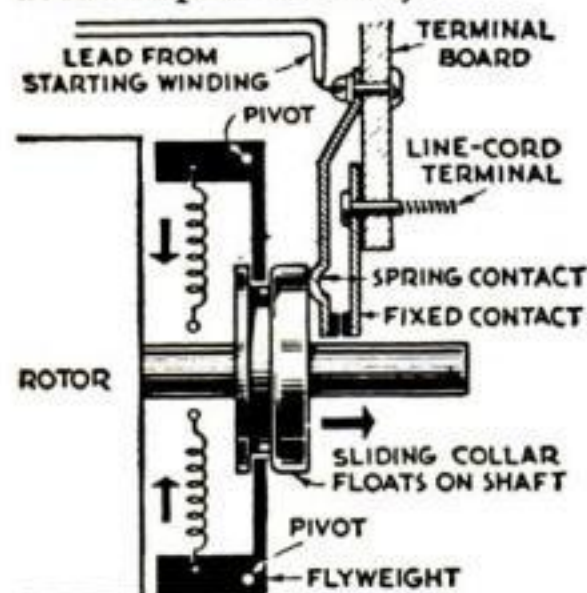
"See?" I said. "It hums, but doesn't turn—" I gaped, for Mike had given the pulley a twist and the motor was spinning contentedly.



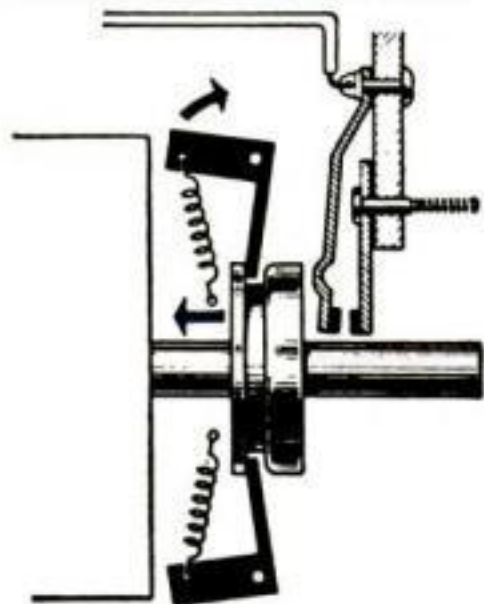
MARK STATOR FRAME and both end bells by making punch dimples close to each other. This will enable you to reassemble them in the same position.



REMOVE FRAME BOLTS holding the motor together. Use a lead or plastic hammer to tap motor shaft, as above, if the end bell does not pull off easily.



CENTRIFUGAL SWITCH works like this. When the motor is at rest, flyweight springs hold the sliding collar against the spring contact, closing the starting circuit, as shown in sketch above. As the rotor reaches running speed, centrifugal force overcomes the springs; the weights fly outward, pulling the collar away and letting the contacts open, as below. There is no wear on switch while motor runs.



"Hey! What'd you do? It wouldn't run for me!" "Take it easy," Mike answered. "We'll just let it run a bit before we start trouble-shooting."

He laid a hand on the motor as it purred on.

"Sorry I bothered you," I said. "Maybe the plug wasn't in tight. I'll take it back."

Mike shook his head. "Not yet you won't. Something's wrong. But there's no sign of overheating, so we'll look for it in the starting circuit."

He pulled the plug, then punch-marked the motor housing in four places and unscrewed four nuts. Taking off one end of the motor, he frowned over a U-shaped piece of fiber encrusted with brass strips.

"Those contact points are dirty," he said. "And there's a thick film of oil on the whole works."

"Sometimes there's a fat spark inside the casing after I turn it on. But how could oil be the trouble?" I asked. "It ran a minute ago."

"If you don't mind a short course on AC motors, I'll tell you," Mike offered. As I nodded he went on.

"Well, in this outside case you have what amounts to a circular electromagnet. Shoot alternating current through it, and you have an intermittent pull-on and off 120 times a second. Right?"

"Yes, but if it's just on and off, why should the shaft turn?"

"Good question. You need a rotary or twisting magnetic field for that. So the field magnet has a second set of coils." He pointed to them. "You see they're between the main windings. So their pull comes 90 degrees later, and you get an out-of-phase field that twists the rotor hard."

"Oh, I see—no I don't. If it's that simple, why the brass spinach inside the end cover?"

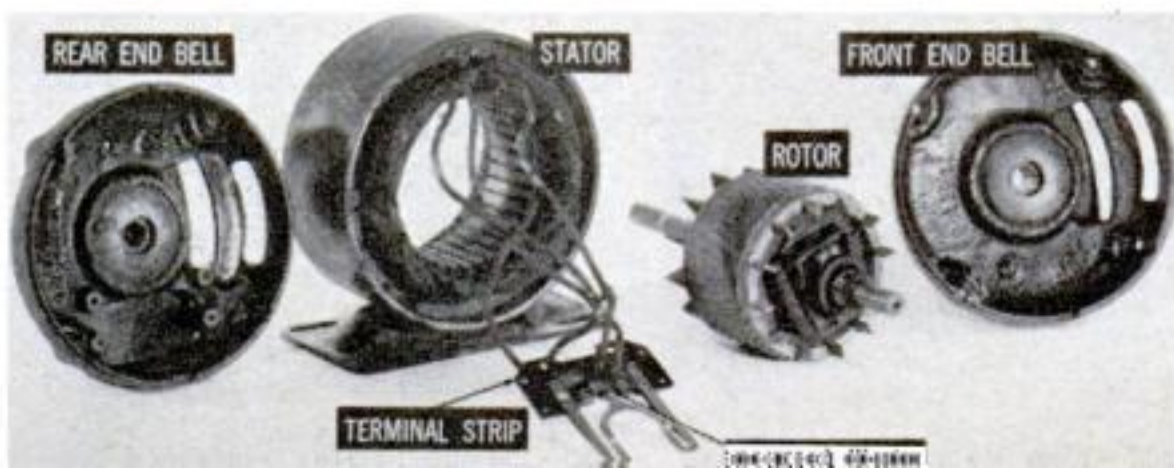
"Because you don't need both windings, once the motor comes up to speed. You saw me start it by twisting the pulley—it kept going on the running winding only. The light starting winding is in series with these contact points."

Mike was cleaning the fiber plate while he talked, with something that smelled like carbon tet.

"You see," he said, "this sliding collar on the rotor shaft is pressed against one flexible contact by springs when the shaft is stationary. Once it spins, centrifugal force makes these two weights fly outward, drawing the collar in and opening the contacts."

"I'm with you," I said. "If the contacts are dirty, they won't close right, and you get no starting twist. But what about that sparking I saw?"

MAIN PARTS of a typical split-phase motor look like this. Blow out loose dirt and wash parts with carbon tetrachloride.



"Watch," said Mike. He disconnected a wire, then touched a test lead to each terminal, while pressing the contacts together.

"See that? The bulb doesn't light. These points are so burned they won't pass current. What burned them was the arcing you saw—every time the motor was started, they burned more."

"But why? Other motors in my shop have run longer. And this is the best one I've got."

Mike grinned. "You killed this one with kindness. Probably oiled it every time you used your lathe."

"Sure. I don't want it to run dry."

Mike shook his head. "Over-oiling makes trouble. Extra oil is thrown on the contacts, making a high resistance that causes overheating. On the break, you get arcing—and more heat."

"After this," I promised, "I'll oil it once a month."

"*Once every three months* is plenty," said Mike as a young fellow came in from the back room. "And only a drop or two at a time. You know Bud Edwards? He helps me Saturdays."

Bud nodded to me. "Mr. Evans, will you take a look at the motor I'm working on? The starting contacts were practically welded together. I cleaned them, and the windings check out fine—but the motor still won't start."

"See anything strange in that, Bud?"

"Strange? No, sir."

"Mm—seems odd to me that the starting windings aren't burned out, if the contacts were stuck together."

Bud leaped as if stung. "Gosh, yes! With juice going through all the time, they should be burned out unless—I get it! It's a capacitor motor, and the capacitor must be open and not passing current, or those windings would be gone. I'll check."

He bounded off. Mike dressed the contact points with a fine file and washed the works again.

"Look, Fred, I'll show you how to check motor windings. First disconnect all the leads on the terminal strip, because you want to test each winding separately. It's smart to identify each wire and terminal with marked bits of tape as you go."

Having removed four wires from the terminal nuts, he picked up the test leads he had used before.

"This is a simple test circuit you can rig in five minutes. Touch one of the test leads to each end of a good winding, and the bulb lights."

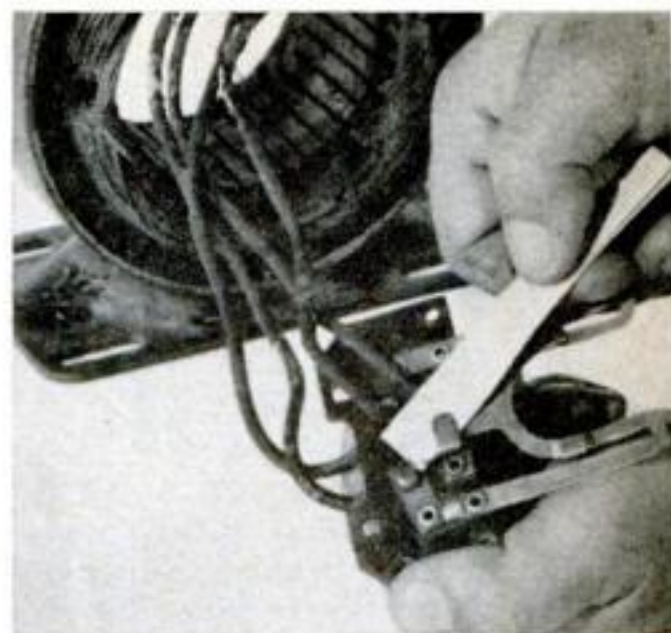
He touched the leads to the two heavier wires, and sure enough the bulb glowed. It glowed again across the two lighter wires. Then he touched one end of each winding and nothing happened.

"Hey! Is that bad?" I asked.

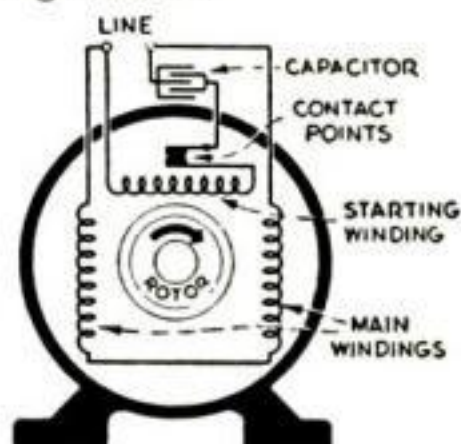
"No, that's good. If the bulb lit, it would indicate a short between the two windings."

Mike made one more test. Holding one lead on the bare metal of the stator frame, he touched the other to each winding. No glow.

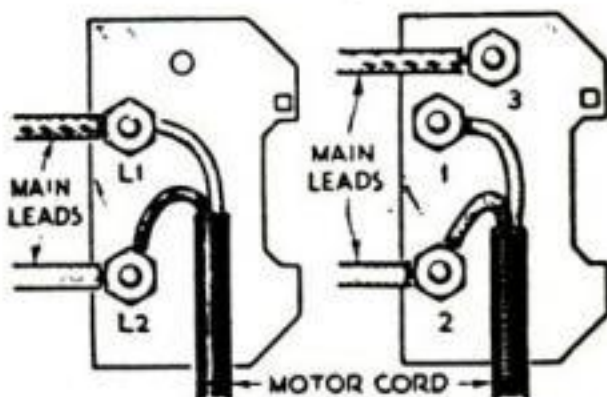
"Bad?" I asked anxiously.



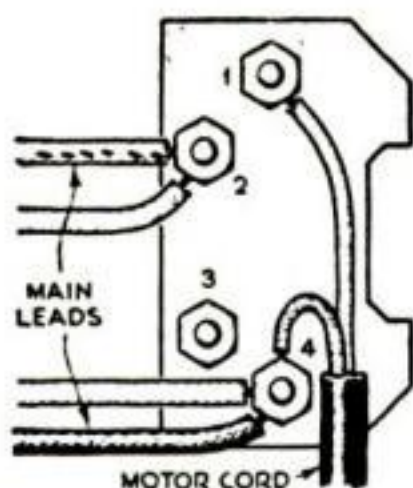
CLEAN STARTING SWITCH carefully with a folded strip of sandpaper as shown above. Then wash contacts and terminal strip in carbon tet to remove oil and grease. Be careful not to bend the contacts askew or alter the spring tension.



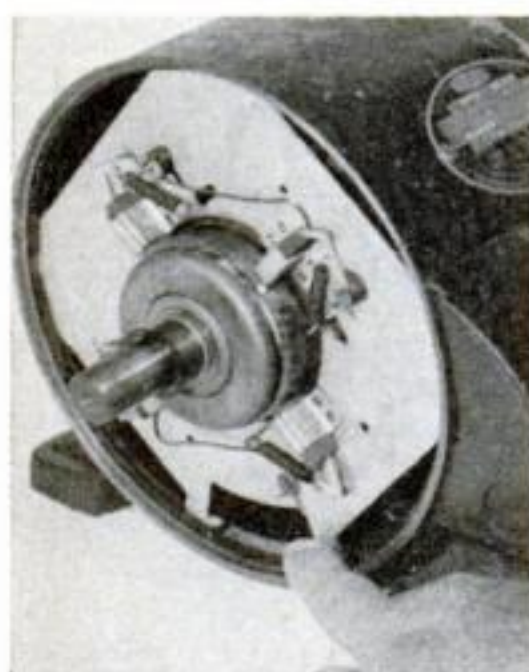
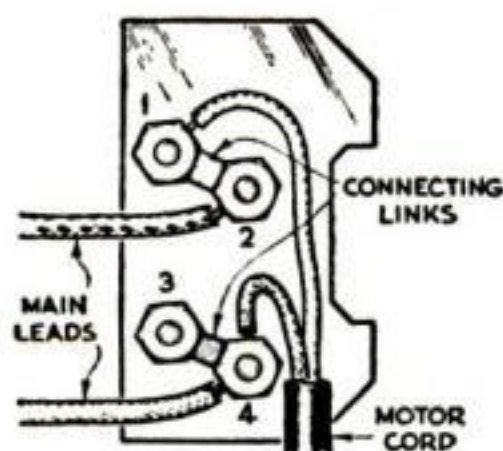
CAPACITOR-START MOTORS, which have more starting torque than split-phase types while drawing less current, have a heavy-duty condenser or capacitor in series with the starting winding. By momentarily storing current, it provides a starting boost. It also absorbs the surge that occurs as the points open, and so reduces arcing. Heavy-duty capacitor motors may have such a condenser in series with the main winding as well as the starting coils.



FOUR WIRES come to the terminal board from inside the motor. If only two are visible, the others are connected on the back of the board. Reversing the two main leads (above, left) will change motor rotation. If in doubt, disconnect two winding leads and use a test lamp to find two ends of one winding. Motors with a thermal-overload switch may have a terminal block as at right. Interchange leads at terminals 2 and 3.



TYPICAL TERMINAL BOARDS for motors that can be connected for either 115 or 230 volts are shown here. To reverse the one above, the main leads must be positively identified. A mistake may damage windings. If in doubt, write the manufacturer. To reverse a motor having strap connectors (below), interchange two main motor leads. Hookups shown are for 115-volt operation.



REPULSION-INDUCTION motors have a commutator and brushes, here visible with end bell removed. The brushes ride the commutator constantly. To reverse such a motor, shift the brush ring according to marks on the end bell. Repulsion-start motors are similar, but the brushes are automatically lifted off the commutator at normal running speed. If brushes are not properly set, starting torque may be low.

"No, good. Any glow now would indicate a ground—some of the winding in contact with the frame."

I shifted my mental gears. "So what? The thing would still run, wouldn't it?"

"Right. But the motor is bolted to the lathe, and you touch the controls, and your cellar floor is concrete, so it could give you a nice, juicy jolt. That's why shop motors ought to be grounded. Just run a wire from a clean spot under a motor bolt to a water or steam pipe, and you'll be safe."

"Thanks. I'll do that—"

"Mr. Evans!" It was Bud back again, a bit wild-eyed this time. "I checked that capacitor, and it was open. So I put in a new one, but it still won't start!"

Mike glanced at me. "Mind if I take out a minute to look? Yours will be okay when I put it together."

We went to Bud's bench. The motor on it had a round black case at one end.

"That's the capacitor," Mike explained. "The old one probably broke down, causing arcing across the contacts, which welded them together."

Thoughtfully he looked at the motor, twisting the shaft. Suddenly he stopped turning it to push it endwise instead. His eyes roved the bench top.

"What's this, Bud?" he asked, picking up a fairly thick fiber washer.

Bud's ears went red. "I—gosh, that's a rotor-spacing shim I forgot to put back. I'll take the motor apart and put it back right away."

"Do that, and then call me," said Mike.

He led me back to his own bench. I itched to ask him why he didn't stay to check the inside of the motor while Bud had it open, but kept quiet.

Mike reconnected the leads to the terminal strip of my own motor and reassembled it with punch marks together on the housing. Making sure the shaft spun freely after the frame bolts were tightened, he plugged it in. It turned, clicked gently, and kept running.

"Good as new," said Mike. "And paid for since that rainy day last month. Don't argue."

I didn't argue, for Bud stuck his head in sheepishly just then. We went back to the other workbench with him.

"I put the shim in, Mr. Evans. Now will you see what's wrong?"

"I don't think there's anything wrong now, Bud. You fixed it." As he spoke, Mike plugged the motor cord in. The motor promptly went into action. "But—but it didn't work before!"

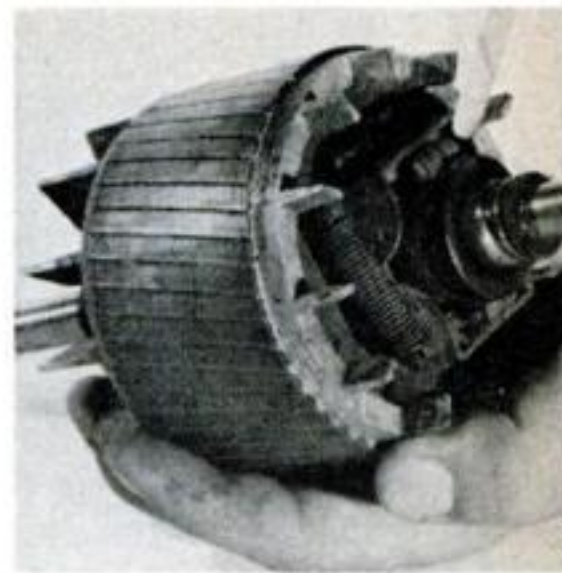
"Because the shim was missing, Bud."

I was as puzzled as Bud looked. "I don't get it, Mike. What does the shim do except prevent shaft end play?"

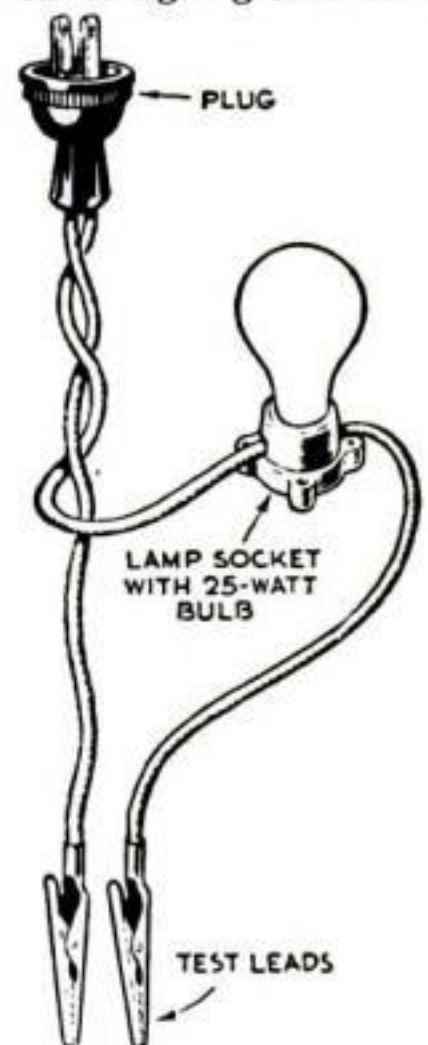
"Nothing. But if this shaft has too much end play, the collar doesn't bear against the starting contacts hard enough to close them. No juice gets to the starting windings, and the motor doesn't start. Bud fixed it when he put the shim back."

TROUBLE-SHOOTING CHART

SYMPTOMS	POSSIBLE CAUSES	REMEDIES
No hum or action of any kind	Blown fuse, faulty switch, faulty line cord, broken internal connections Open capacitor in capacitor start and run motor Motor burned out	Check each and repair as required. Check capacitor, and replace. Check windings for charring. Rewind.
Motor hums, but will not start	Broken leads in starting winding circuit Starting-contact points dirty Starting-contact points not making contact Excessive end play in rotor shaft holding contact points open Starting capacitor open	Check for break, and repair. Test and clean. Rework as required to make contact when motor is not running. Shim rotor shaft with fiber washers to reduce end play to 1/64". Check and replace. (Emergency operation possible by wiring capacitor leads together, and operating motor as straight split-phase.)
Motor heats excessively	Motor overloaded Ventilation has failed Internal grounds or short circuits in windings Rotor dragging on stator due to worn bearings Bearing tight due to lack of lubrication or improper alignment of end bells.	Operate without load and see if heating continues. Clean vents and blow out motor housing with air blast. Check windings for shorts and grounds. Inspect rotor, check bearings, and replace as required. Treat as required.
Excessive vibration	Pulley out of balance or loose Worn bearings Rotor out of balance Internal shorts in running windings Motor and load misaligned	Try another, or tighten. Replace bearings. Have repair shop balance rotor. Have checked at a repair shop. Correct alignment.
Motor sluggish and slow to start even without a load	Low line voltage Starting winding shorted or grounded internally Windings of starting winding shorted to each other Capacitor leaking internally, or too small	Check line voltage; check line for overload. Check starting winding for short to main winding and stator. Repair or rewind. Requires checking by a motor-repair shop; rewinding necessary Have repair shop check capacitor.



CHECK SPRING ACTION on the flyweight assembly. Weak or broken springs may not press the sliding collar firmly against starting contacts. Lubricate collar only with a grease stick. Never use oil or light grease on it.



A test lamp makes it easy to find breaks

TO TEST WINDINGS, remove all leads from the terminal strip. Running or main winding has huskier coils than starting winding. Test lamp is wired as in sketch at right. Use insulated test leads or clips to avoid shock. Touch one to each end of a winding (below). If the lamp does not light, look for break in connection of leads to winding. If the break is internal and can be located, repair by splicing and insulate well. If break cannot be found, have motor rewind.

Check for grounds between both the windings and frame, too. If lamp lights with one clip on bare metal and the other touching any winding lead, locate short and insulate at that point. Motor may run with a ground, but it is a shock hazard. Also check for shorts between the windings by touching test clips to one lead of each. Make sure all leads are off terminal strip for this test. If the lamp lights, try to determine where the windings make contact.



Short Cuts and Tips

FROM PS READERS

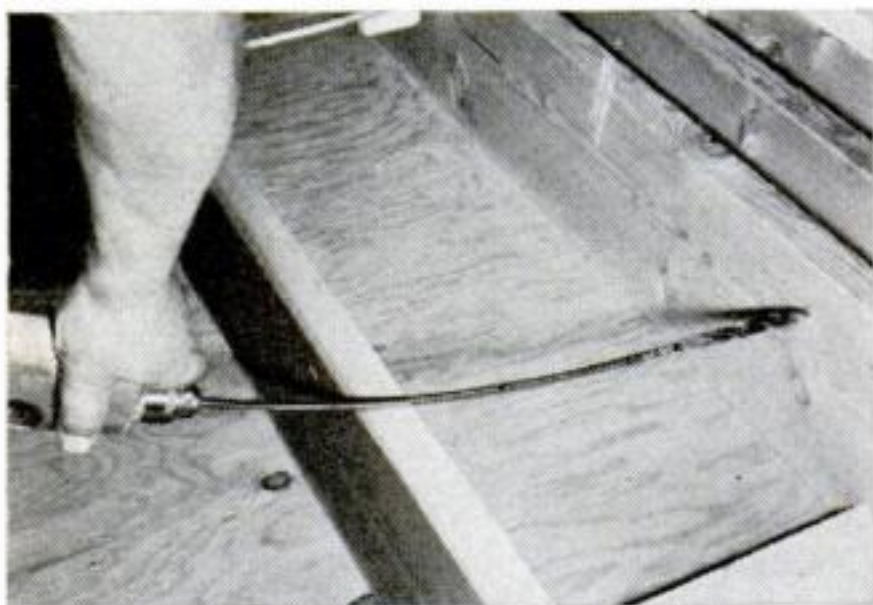
Sandbox Built to Last a Lifetime

SPIKE eight discarded railroad ties together to make a rustic, king-size sandbox. The bulkiness of the ties forms a bench around the play area and assures that the box will stay put. Just about indestructible, the box shown is entertaining its second generation of kids.—*Darrell Huff, Pacific Grove, Calif.*



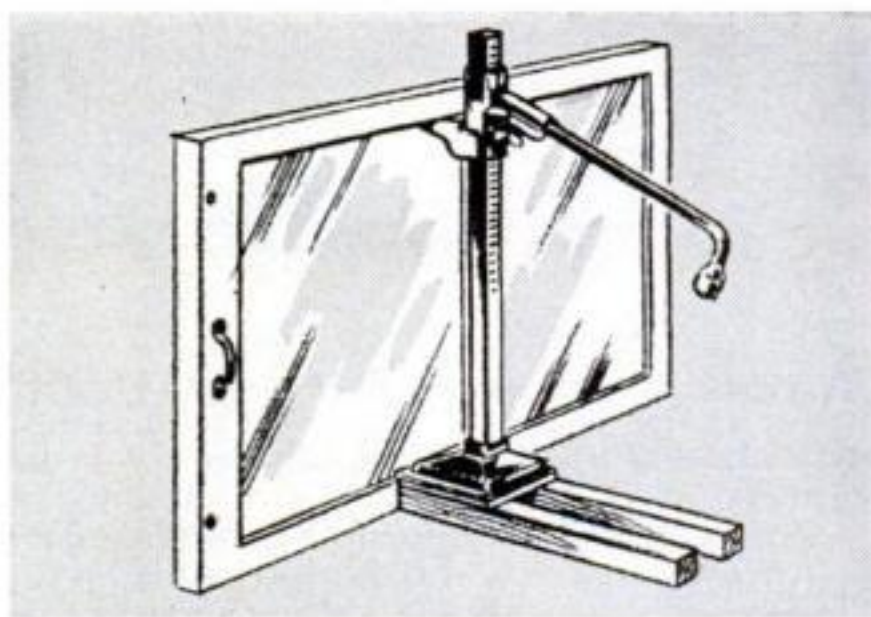
▶▶▶ You can compute rainfall by using an empty paint-spray or other can with an inside diameter of $2\frac{25}{32}$ ". Cut off the top evenly and set the can in the open, away from trees and buildings. A weight inside, to keep the can from blowing over, will not affect the reading. After a rain, pour the contents into a 100-cc. graduated cylinder to measure the

volume. Since 100 cc. is equal to 6.1 cubic inches (1" of rainfall on an area of 6.1 sq. in. or a circle with a diameter of 2.785"), each cc. in the cylinder equals $1/100$ " of rainfall. For snow, press the open end of the can through the snowfall to a hard surface, compacting the snow in the can. Melt and measure.—*W. E. Helmick, San Marino, Calif.*



Rod as Flexible Drill Shaft

DRILLING in places where there's no room for the electric drill is easy if you have an 18" or 24" length of $\frac{1}{4}$ " cold-rolled rod brazed to the shank of the drill bit. The rod will flex and transmit power like a flexible shaft, permitting you to drill around objects that would ordinarily be in the way. The braze will be stronger if you turn down the drill shank to $\frac{1}{4}$ " diameter or use a drill with the shank already reduced.—*James A. Lockhart, Bryan, Ohio.*



Bumper Jack Salvages Glass

IN MY business—installing aluminum windows—I often remove old wood sash from homes. After trying many unsuccessful methods of removing old glass quickly, I found that placing a car bumper jack against the top and bottom of the window frame forced the sash apart in seconds, freeing the glass for re-use. (I prop the jack on blocks to make it easy to slip the sash under the base.) Only about one pane in 50 was broken using this method.—*E. McGuire, Yonkers, N.Y.*

Canvas Panels for Indoors or Out

By Paul Corey

INEXPENSIVE canvas panels will serve as fences, windbreaks, sun screens, or a patio roof. Indoors, similar panels become room dividers, movable partitions, and decorative backdrops. You can even make several basic screens do double duty. Use them outside in summer, inside in winter.

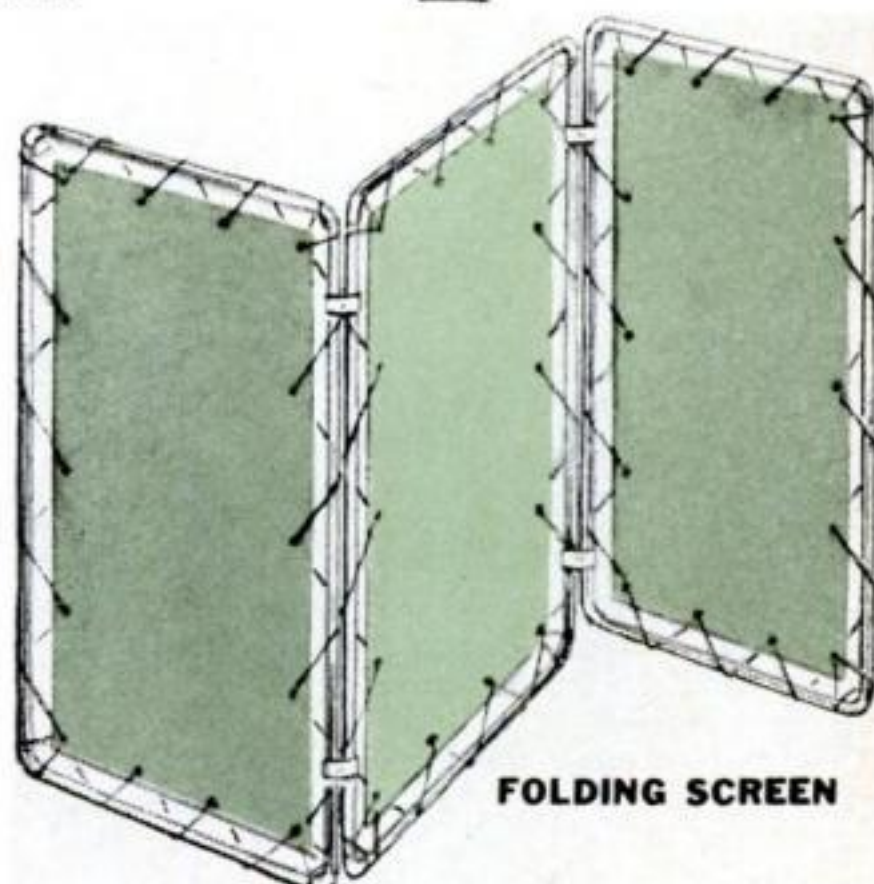
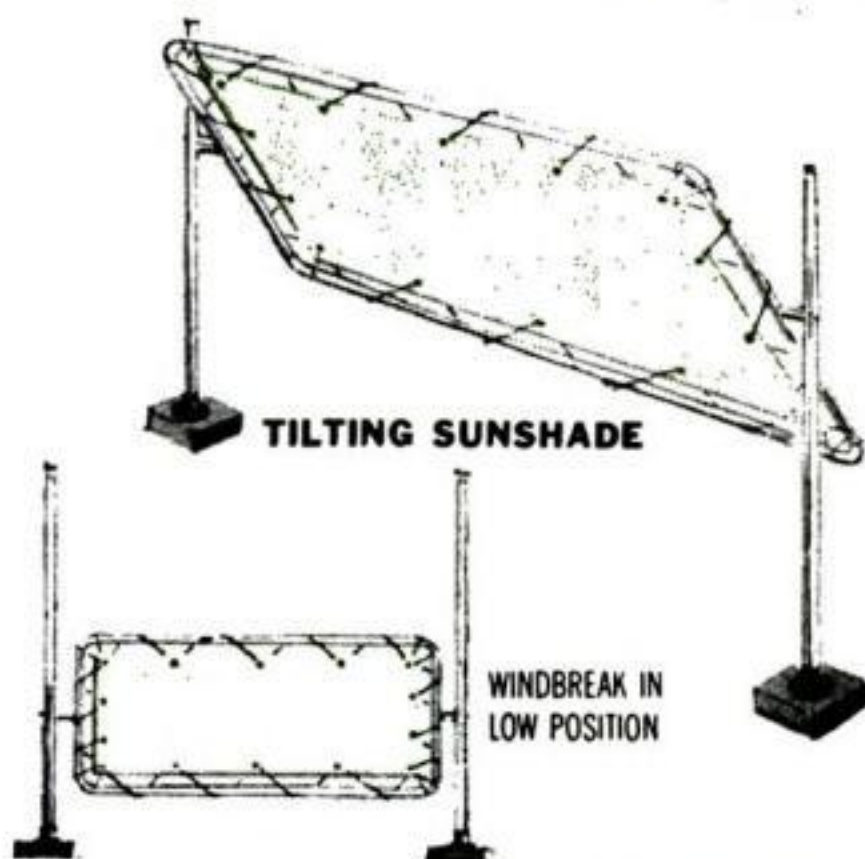
Because of its light weight, canvas can be simply framed, saving the work and cost of heavy construction. Lashed to slim poles, it can be put up or taken down as you need it. Outdoor screens can be removed in winter and stored away to prevent weathering. Portable screens can be moved around your home or yard, even taken along on vacation trips.

Vivid colors in solids, plaids, and stripes also make canvas ideal for modernizing a home. From time to time, you can add new colors and patterns, using the original frames.

How you buy canvas. You'll find the terms canvas and duck used generally to mean the same thing, although duck is a slightly lighter weave. Both are heavy cotton and are tough and durable.

Weights range from 10 to 15 ounces a square yard. The 15-ounce type is the heaviest but can be sewn on a home sewing machine. Use the largest nylon thread the machine will take for best results.

Plain canvas comes in widths from 29" to 72", colored canvas in widths

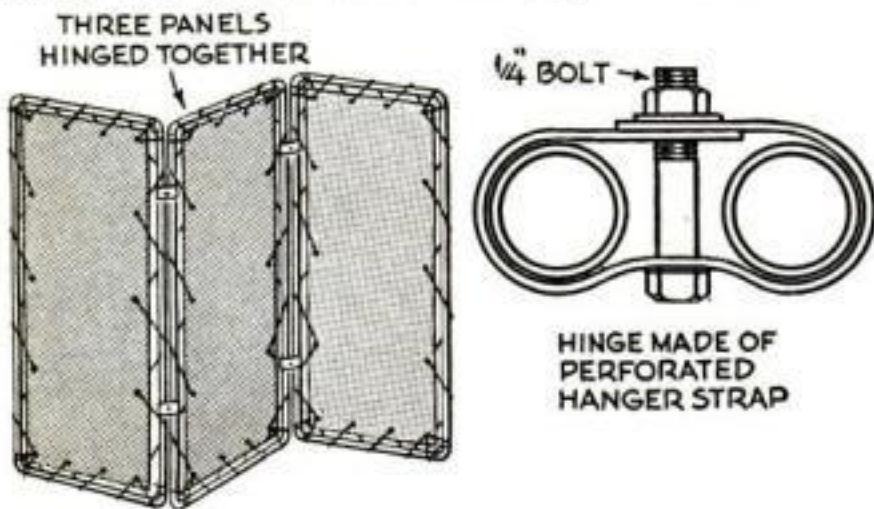


CONTINUED

How to make a screen tilt



How to join a folding screen



from 15 $\frac{3}{4}$ " to 31". Plan your job to take the widest available widths and you'll cut down the number of seams.

Cheaper grades of colored canvas are printed and the color shows on only one side. The more expensive grades are woven with colored threads and the pattern is the same on both sides.

Plain white canvas costs as little as 60 cents a square yard. Colors and patterns go up to \$2 or more a square yard. For outdoor uses, be sure the colors you buy are fadeproof.

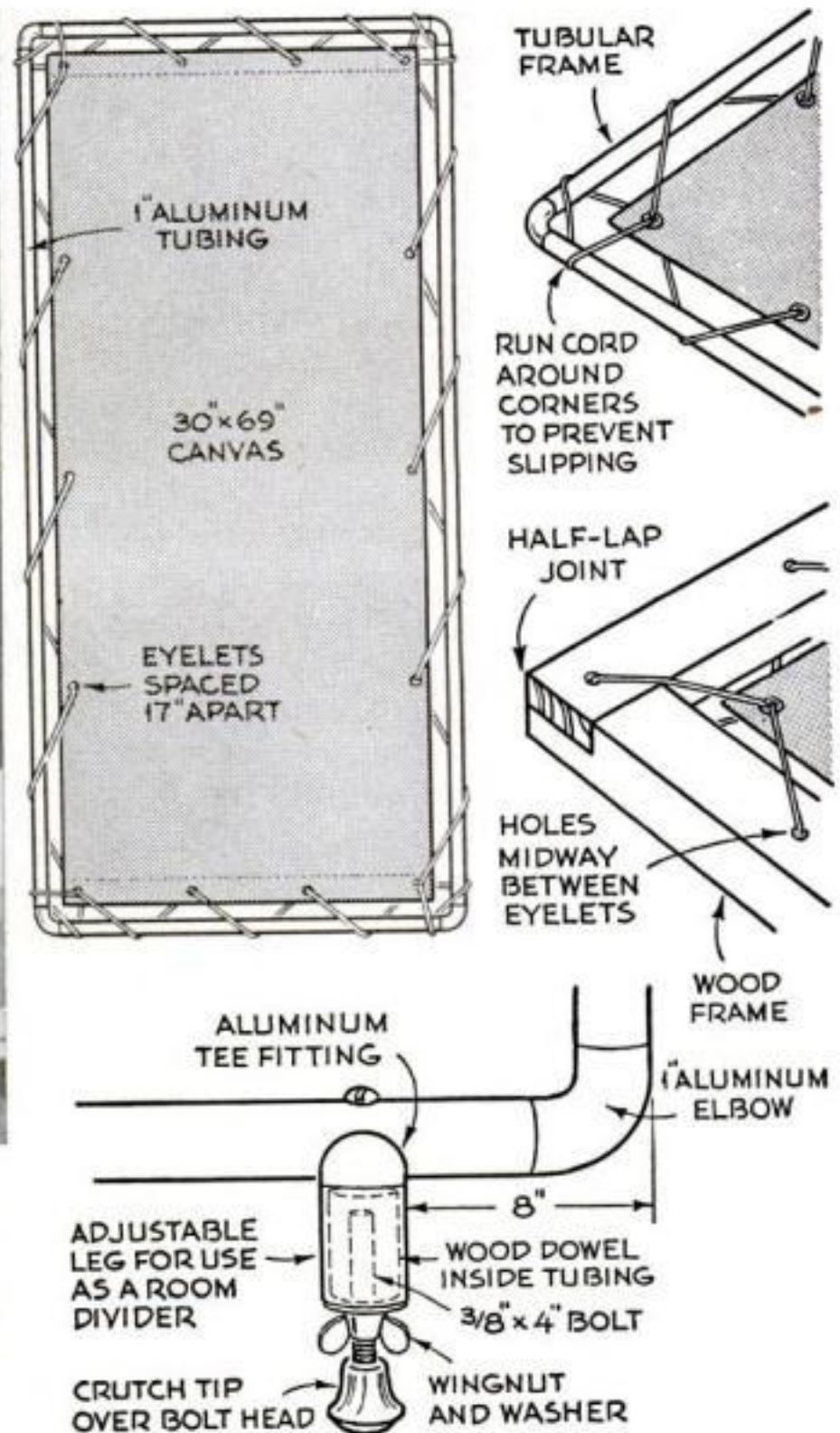
Fastening is easy. For a quick job, canvas can be simply tacked or stapled to a light wood frame. There are a number of special fasteners on the market, however, that give a slicker-looking result and also enable you to put up or take down the canvas quickly.

Eyelets (also called grommets) make it easy to lace canvas panels to any kind of frame. Turn and snap fasteners, the

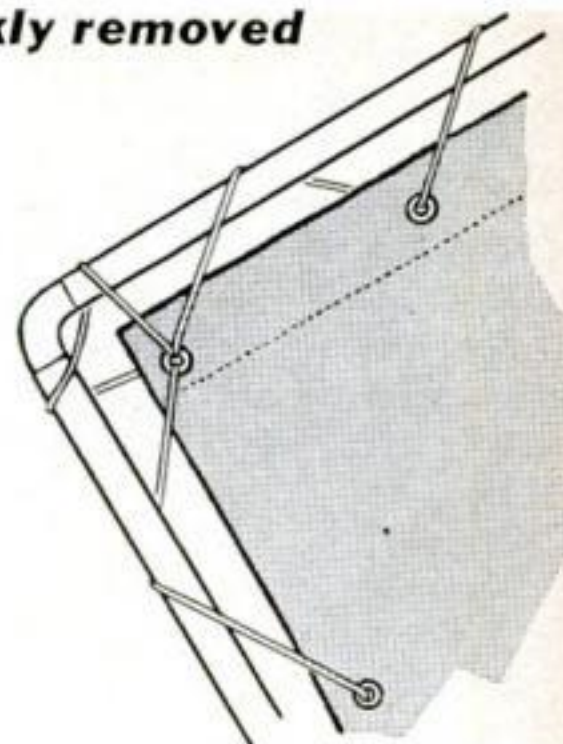
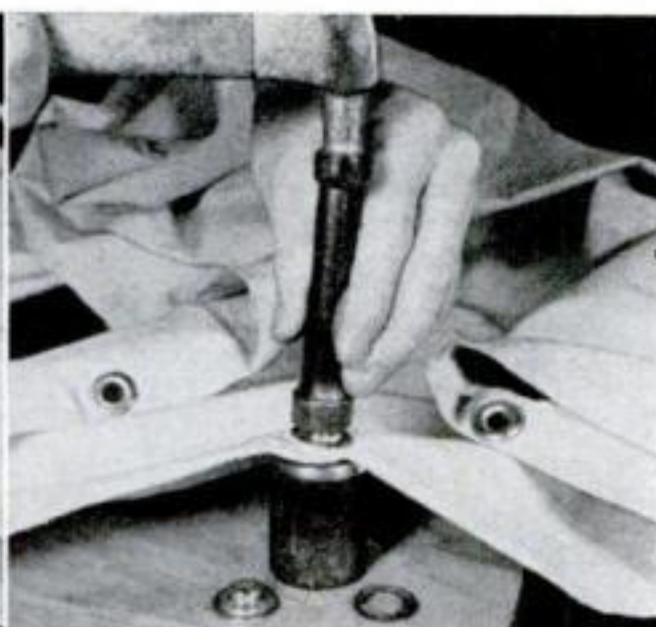
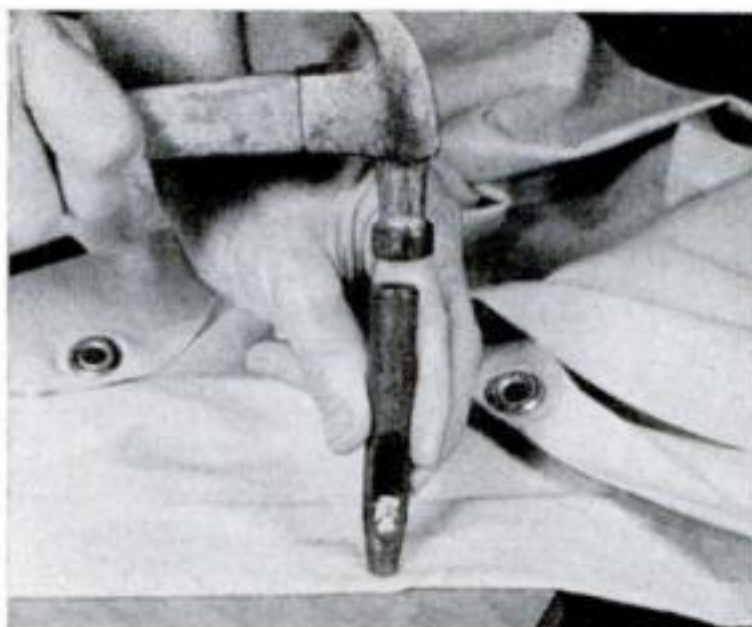
How to make a basic canvas panel for use anywhere



AS A ROOM DIVIDER, this portable canvas panel adds color and privacy to living areas, can be moved quickly. It rests on two short legs that can be adjusted in height, as in the drawing at right, to wedge the screen against the ceiling. Basic panel is 6' tall, 34" wide, uses only two yards of 30"-wide canvas. Frame is 1" hardware-store aluminum tubing.



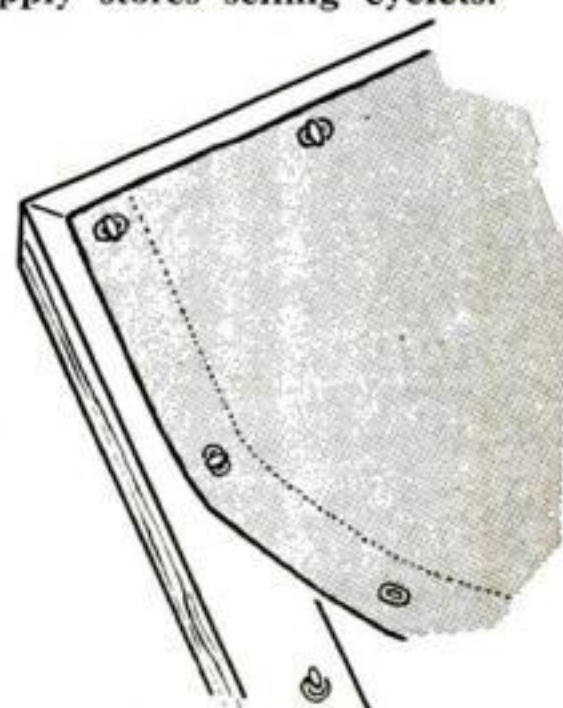
Three ways to fasten canvas so it can be quickly removed



1. Lashing canvas with cord

METAL EYELETS allow you to lace canvas without tearing it. Cut holes for the eyelets with a special punch hammered into the canvas over a wood block (left). Slip the larger eyelet half through the canvas and set it, neck up, on a

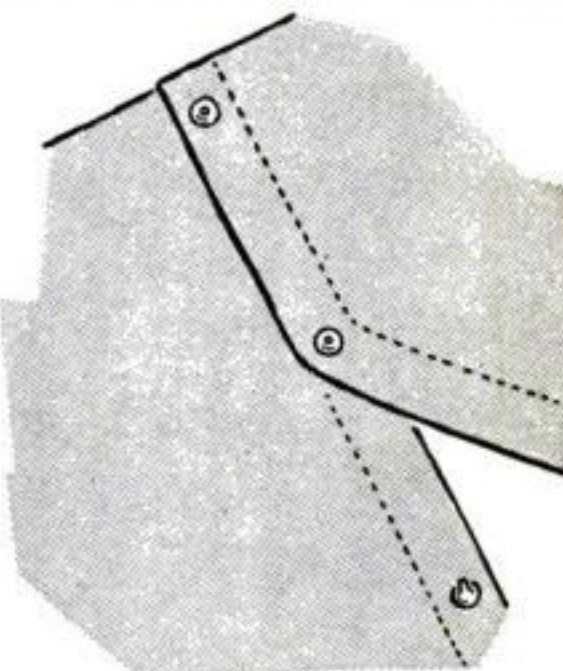
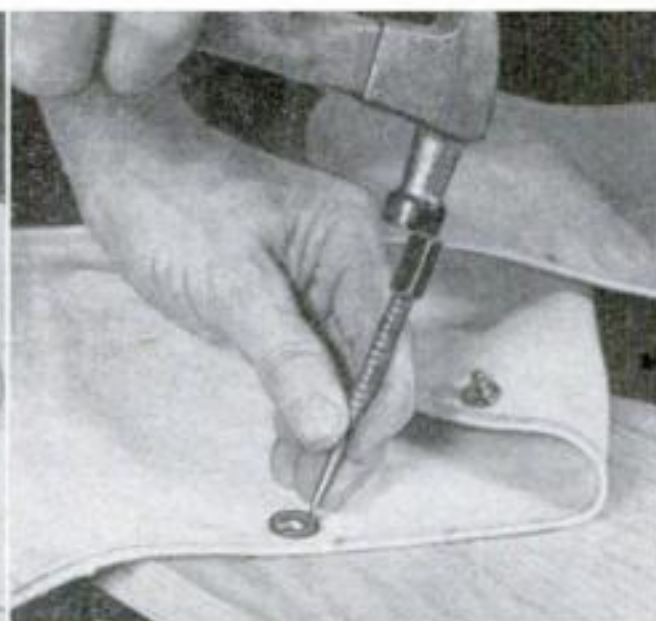
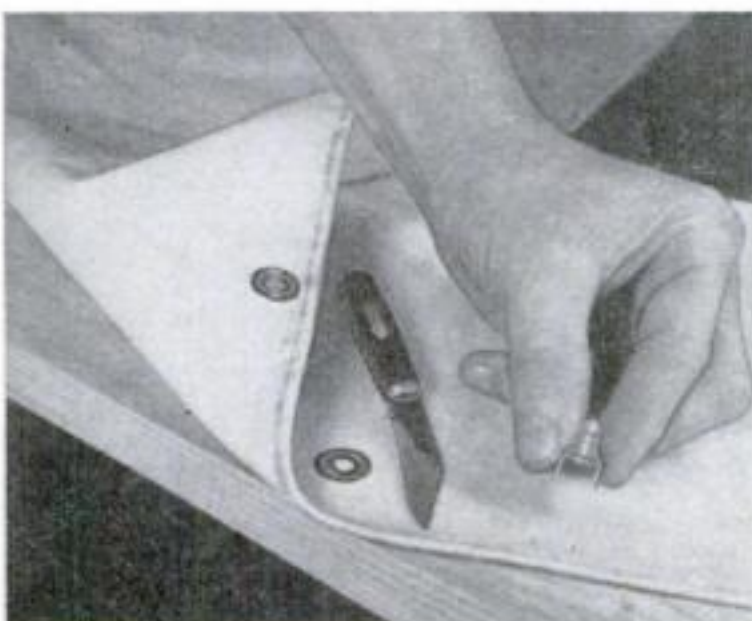
metal anvil (center). The other half is then placed on top and the neck rolled down over it with a setting tool. Inexpensive cutters and setting tools can be bought or rented at hardware or boat-supply stores selling eyelets.



2. Attaching canvas to wood

TURN FASTENERS have threaded studs that screw into wood (left). Rings in the canvas slip over the studs and are locked on by twisting the tops of the studs crosswise. Snip out an oval hole to match the ring's opening and press the

pronged half into the canvas. The flat half is then placed on top and the prongs hammered down over it. A similar stud is also made for mounting in canvas when you want to edge-join two pieces of material for easy handling.



3. Joining canvas to canvas

SNAP FASTENERS consist of a pronged stud set in one piece of canvas and a matching ring in another. This lets you quickly snap the two pieces together or pull them apart. Press the prongs through the canvas (left), then turn

the stud over into a small hole in scrap wood. A washer is slipped on top and the prongs crimped over it (center). The ring is installed in the same way. Studs with a screw shank are also available for fastening to wood.

kind used on boats, let you attach canvas to wood. The fasteners screw into the wood and the canvas hooks over them. If you don't want to handle one large sheet, you can edge-join several smaller panels with still other types of fasteners. How these different fasteners work is shown in the photos.

All-purpose panel. The single panel of canvas shown in the photos and drawings can become anything you want it to be without changing its size or basic design. Fitted with legs, it's a room divider. With swivels at the sides, it's a tilting sunshade. With a single pivot at top and bottom, it can be a rotating screen to let in or block out the breeze, as you wish. Several panels lashed together become a portable folding screen.

The panel shown takes only two yards of canvas 30" wide, making it about 6' tall. With the ends hemmed, the material becomes about 69" by 30" (no hems are needed at the edges). If the canvas is to be lashed to the frame, as here, the frame should be made about 2" larger all around. If the canvas is to be attached directly to the frame, the frame should be exactly the same size.

Besides canvas and frame, the only other materials you need are 14 eyelets and 30' of Venetian-blind cord. The cord can be obtained in colors if you want it to match or contrast with your canvas.

Making the frame. You have several choices here. One of the nicest materials to use—although not the cheapest—is the type of do-it-yourself aluminum tubing readily available in hardware stores. It comes with a full line of fittings for making corners and T joints.

Ordinary 1/2" plumbing pipe can also be used except that it's not possible to screw all four corners together without loosening one or more of them. One answer is to insert a pipe union, but this adds a bulky-looking fitting. If you're handy with a soldering torch, an inexpensive frame can be made by sweating together rigid copper tubing.

A wood frame is the cheapest and easiest to make. Outdoors, a frame of redwood or cedar is both rotproof and rustic-looking. With this type of frame, you can either lace the canvas to holes drilled in the wood or attach it directly to the wood with the special fasteners. With pipe or tubing, the only practical way is to lash the canvas on.

In locating your fasteners, there's one important difference: When lashing canvas to wood, the holes in the frame should be placed *midway* between the eyelets so the cord runs diagonally from eyelet to hole to eyelet, and so on. When attaching canvas directly to wood, the fasteners in the frame must be placed exactly *opposite* the eyelets because the eyelets hook over them.

Mounting the panels. For a room divider, an easy way to install a canvas screen and keep it movable is to use the adjustable feet shown in a drawing. These consist of wood dowels inserted in the frame's legs and drilled for bolts. A wingnut on each bolt permits the legs to wedge the screen between the floor and ceiling.

For a wood frame, insert the dowels directly into holes drilled in the base. Use two-by-threes or two-by-fours for the frame to provide sufficient bearing area for the dowel legs. For a legless frame, one-by-four lumber will do.

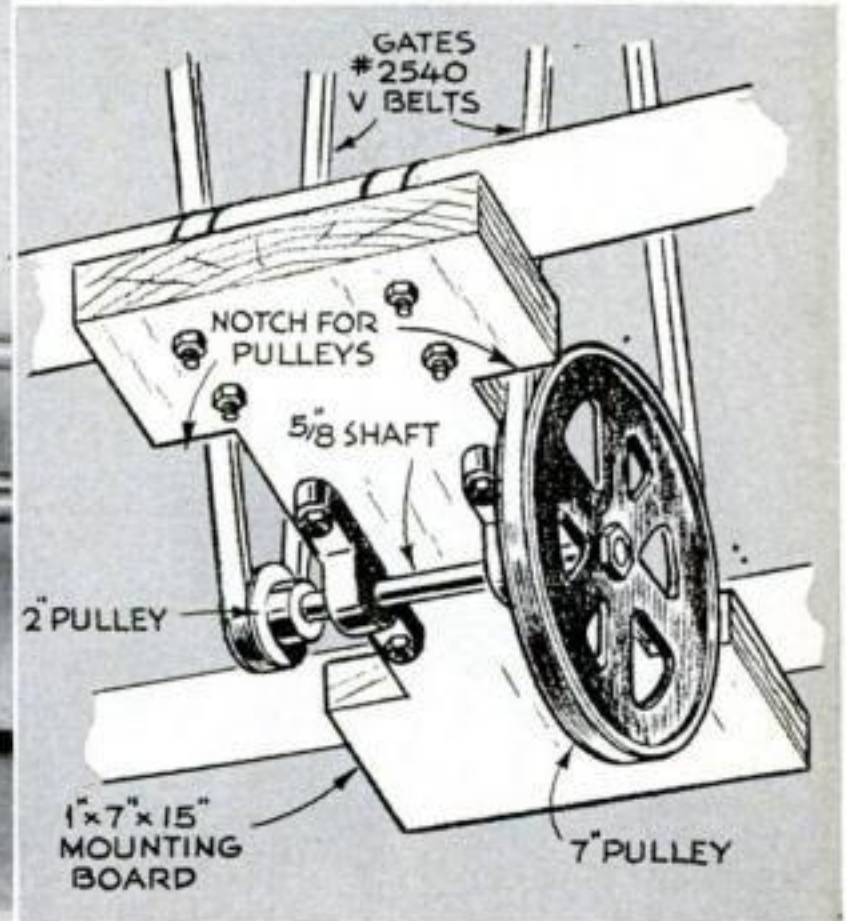
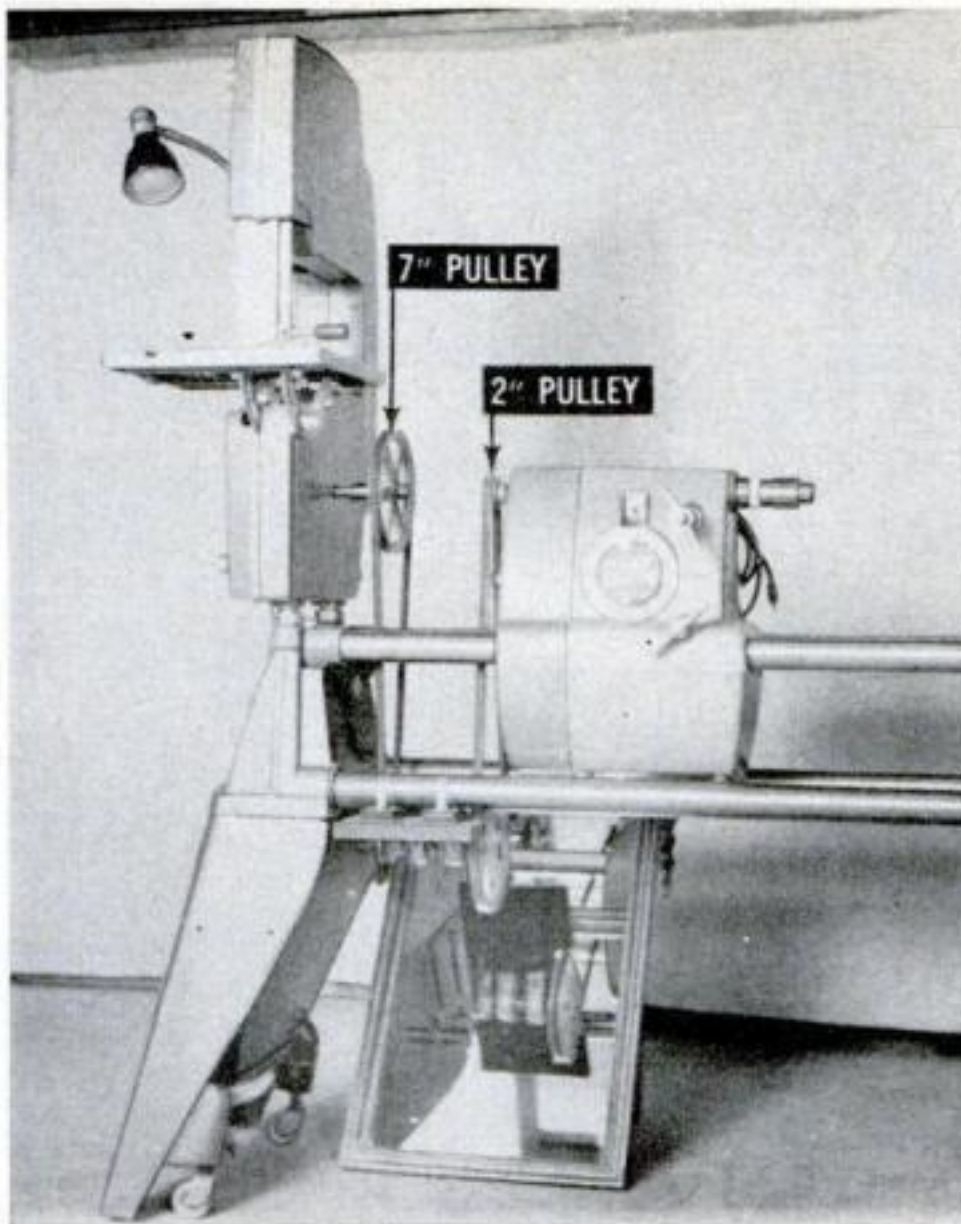
A panel with a single leg at the top and bottom will give you a rotating screen to control sun and breeze like a louver. The ends of the legs can be held loosely in pipe flanges or in holes drilled in blocks of wood. The drawings show other arrangements for making tilting and folding screens.



CANVAS ROOF for a patio needs only a light wood frame for support because of its very low weight. The canvas strips, snap-fastened on, can be removed in winter to avoid snow-loading.

Short Cuts and Tips

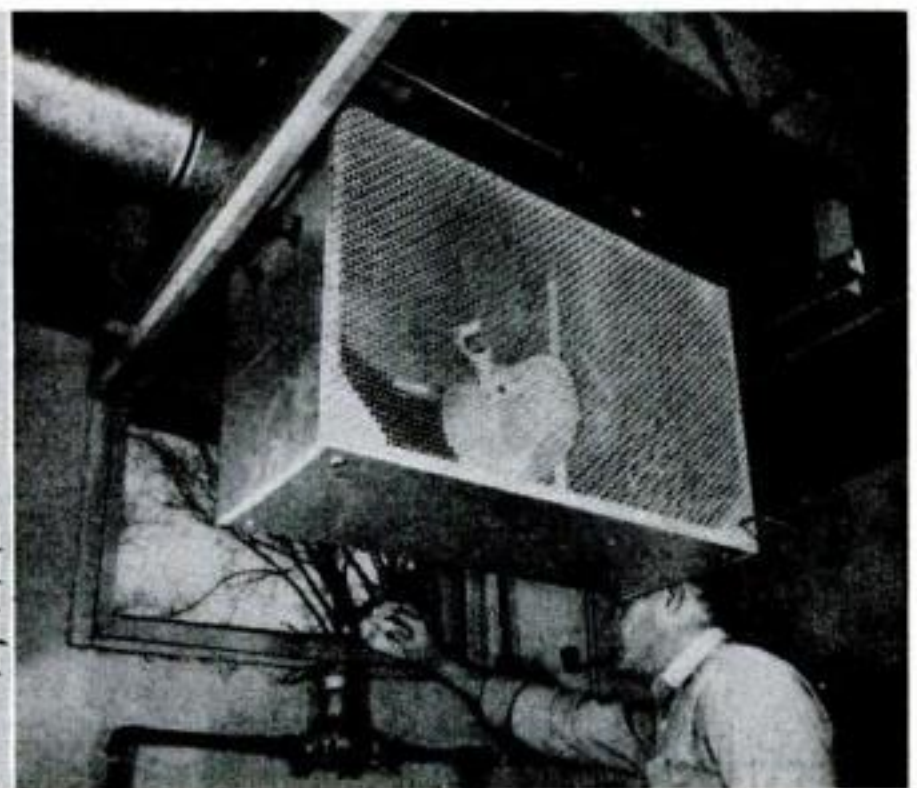
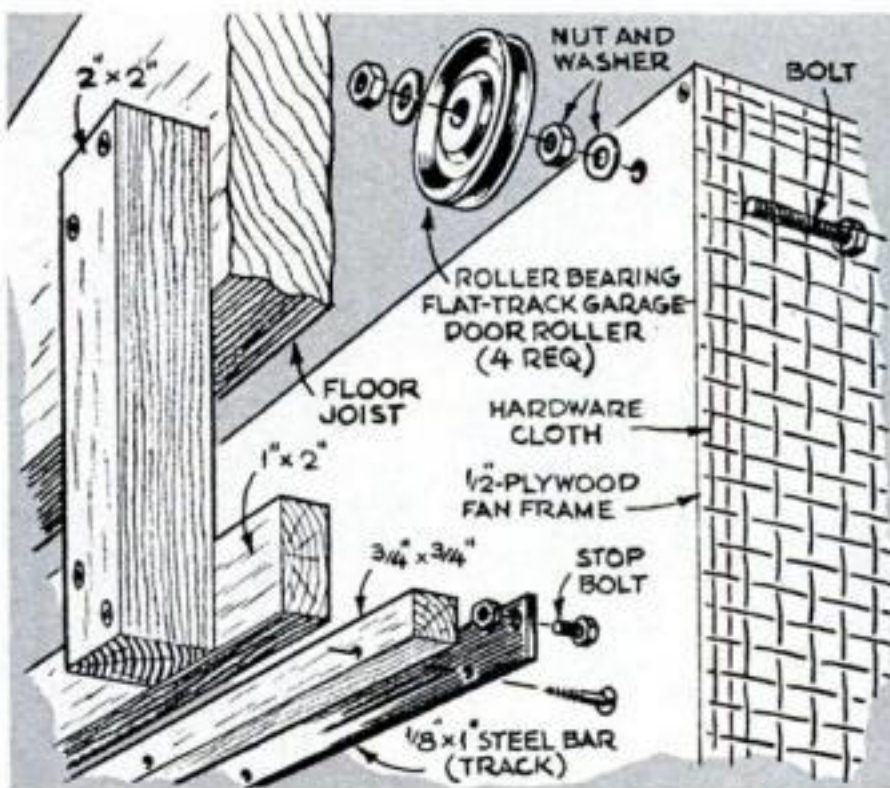
FROM PS READERS



Speed Reducer for Shopsmith

THE bandsaw unit of my Shopsmith ran too fast to cut steel. So I made a speed reducer from two 2" and two 7" V-pulleys and a 7" length of $\frac{5}{8}$ " shaft. This is mounted on a board beneath the

machine, as in the mirror view at left, with aluminum straps that pivot on the front rail for tensioning the belts. It drops when not in use and need never be detached. One 7" pulley goes on the bandsaw and one 2" pulley on the drive spindle.—A. G. Haeberle, St. Peters, Mo.

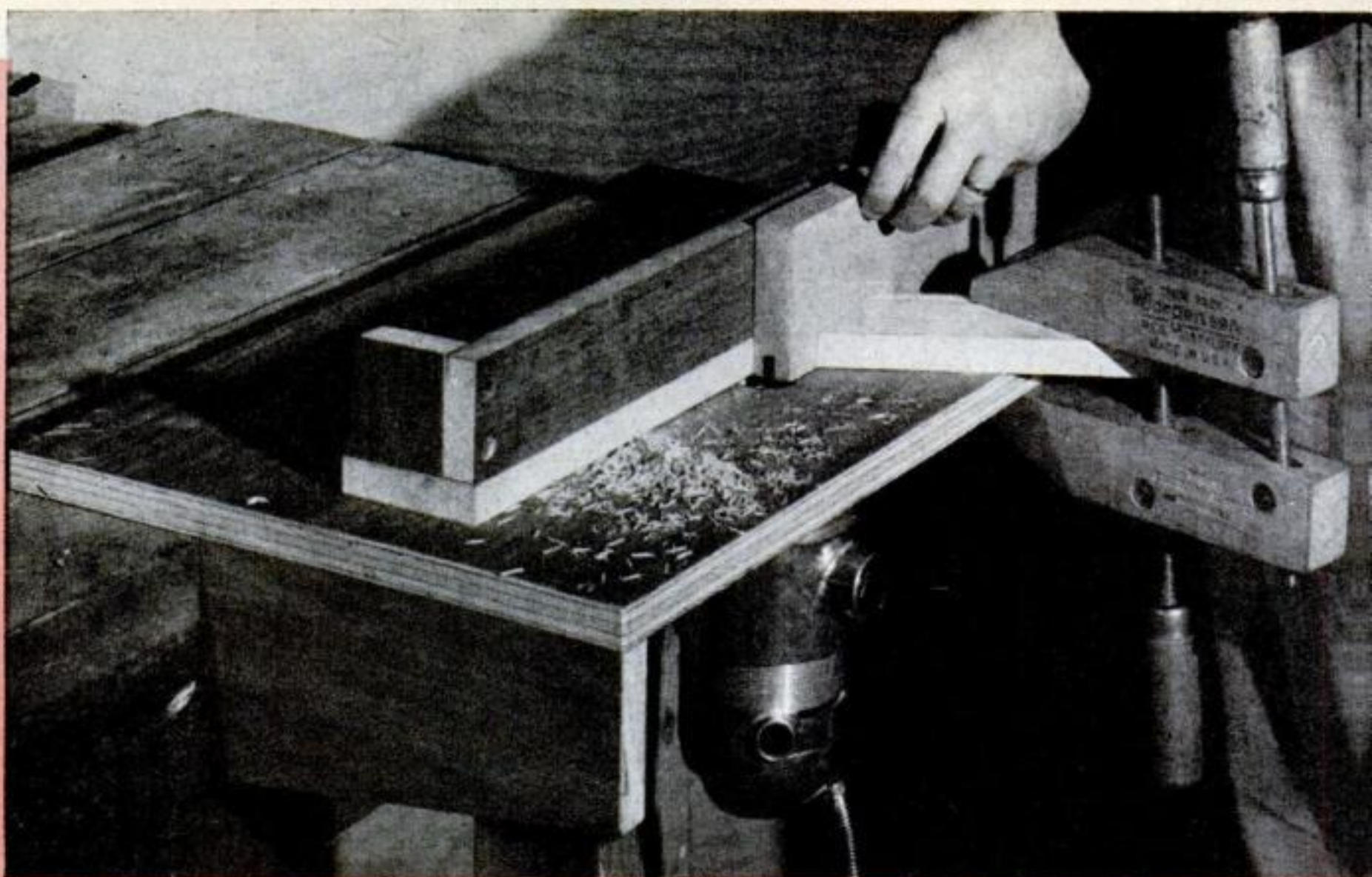


Overhead Track for Fan

INSTEAD of taking down your basement ventilating fan and storing it for the winter, install rollers on the housing and mount it on a track suspended from the joists. This way you can roll back the

fan to open the window, and push it into the opening to air the basement any time you like.

Use flat-track garage-door rollers and a steel-bar track, or roller-skate wheels riding in a wood track made to fit.—Phil McCafferty, Cedar Rapids, Iowa.

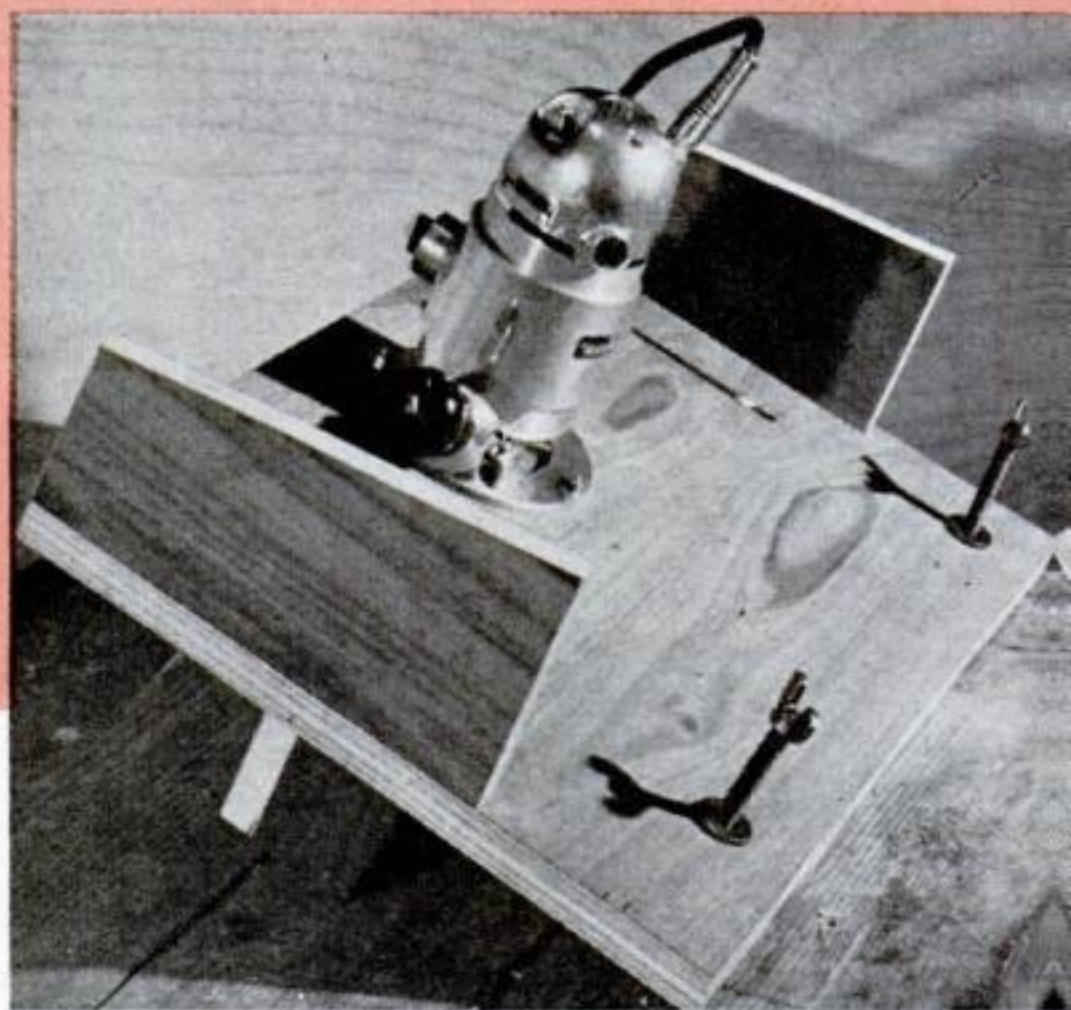


Plywood Table for a Router

A SIMPLE plywood table and two fences to fit it will enable your router to do the work of jointer and shaper. The table stores out of the way easily and can be set up in a minute.

Two carriage bolts fasten the table to the edge of your workbench; two braces add rigid support. The router baseplate is bolted to the underside of the overhanging part of the table, and a 1½" hole is drilled directly above it for bit clearance. After the first assembly, the bolts that hold the router can be permanently set in the table by bedding the heads with epoxy glue.

Both fences should be about as long as the width of the table for maximum sup-



BASEPLATE OF ROUTER is bolted to the underside of the table. The router's depth-of-cut adjustment can be used to extend the cutter bit to the required height above the table.

port of the work. The shaper fence is made by fastening two 2½"-wide lengths of plywood together at 90 degrees with glue and screws. End braces hold the upright piece square to support work held vertically against it.

The jointer fence is similar, except

New Ideas in Photography



Brownie
Starmatic
Camera

Lens "squints" for beach
or snow scenes . . .

opens up a bit in
average sunshine . . .

opens wide in shade
for clear pictures

**Picture it now—
See it again and again**

Automatic Camera is Amazingly Accurate

This automatic electric-eye camera is not only easier to operate than a separate light meter and camera—it's also more *accurate*.

The reason? In each Brownie Starmatic Camera, the built-in meter and shutter are custom-matched to each other by a final factory adjustment. Thus, any of the common variations of meters and shutters are balanced out, and exposure errors are eliminated!

Shoot in bright sunlight or in shade, the lens opening adjusts automatically for correct exposures. When light is too dim, a signal tells you to use flash.

You get snapshots or slides, 12 beautiful pictures to a roll on economical 127 film. Can't take an accidental double exposure. Brownie Starmatic Camera costs less than \$30, or as little as \$3 down.

"Electric Fingers" Thread the Film For Automatic Movie Projectors

Now you can get your movie shows under way with no fuss, no fumbling. Just choose a Kodak automatic movie projector.

All you do is insert the end of the film in a slot. "Electric fingers" then take over, to start your show automatically. They thread the film through the gate . . . form the loops . . . and guide the film down to the take-up reel, which picks it up automatically! It's quick, reliable, all automatic, and astonishing to see.

There's a Kodak 8mm automatic movie projector in every price range. See them at your dealer's.

Brownie 8 Movie
Projector, A15,
less than \$55.



Kodak Cine Showtime Pro-
jector, A20, less than \$125;
Model A30, less than \$150.

Brownie 500 Movie
Projector, A5, less than \$95.

from Kodak

Sensitized Photo Balloons Used in Diagnosis of Stomach Cancer

Rubber balloons coated on the inside with special Kodak photographic emulsion are being used with great accuracy to detect stomach cancer.

A patient is fed a tiny amount of radioactive phosphorus 32. Then he swallows an emulsion-coated balloon which is inflated until it is in contact with the stomach walls.

Cancerous tissues absorb more "P32" than normal tissues, and show up as darkened areas on the balloon when it is removed from the stomach and processed.

Knowledge gained by Kodak in creating such specialized products for medical, scientific, and industrial use, also helps produce finer films and equipment for amateur photography.



Dark areas on balloon reveal presence of stomach cancer. Kodak scientists worked for several years to develop a fast, flexible emulsion for the balloon coating. The balloons are now available to physicians.

Versatile Slide Projector Lets You Use Any of 3 Changer Systems

This handsome new Kodak 500 Projector, Model B, puts the accent on versatility. It lets you choose any of *three* modern slide-change systems—fast-action Kodak Readymatic, Airequipt magazine, or Universal tray.

And it gives you great performance. The 500-watt lamp and big condensers show both 35mm and super slides brilliantly. The 4-inch *f*/3.5 lens gives big-screen images even in small rooms.

A quiet, turbine-type blower pulls cool air in over your slides and around the lamp. Elevation and focus knobs are on top for easy adjustment. Handsome two-tone styling. Sturdy case cover.

With Kodak Readymatic Changer and 4-inch lens, Kodak 500 Projector, Model B, is less than \$68, or as little as \$7 down. Ask your dealer to show you how smoothly it works with each of the changers.

Prices are subject to change without notice.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

See Kodak's "Ed Sullivan Show" and "Adventures of the Nelson Family"

See your dealer for exact retail prices

Kodak 500 Projector, Model B

Kodak Universal Changer is versatile—handles card, glass, plastic or metal mounts in trays.

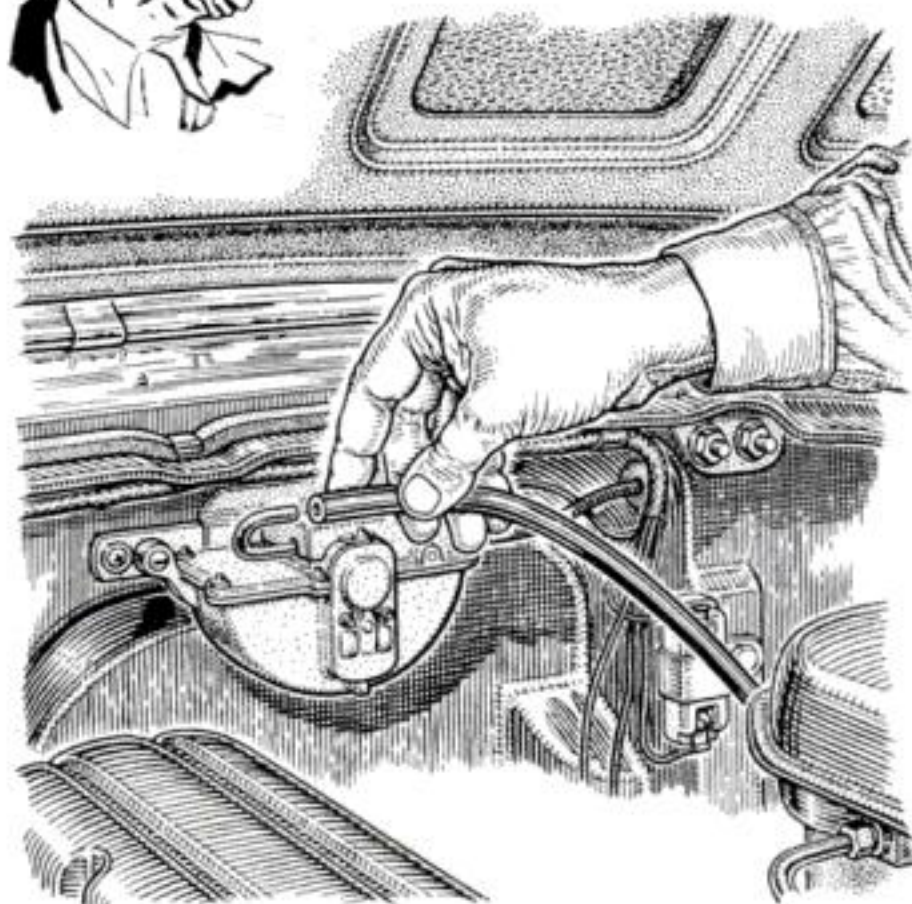
Airequipt Magazine Changer stores each slide in a sturdy, durable metal frame.

Kodak Readymatic Changer for card-board mounts. Quickest from slide-box to screen.

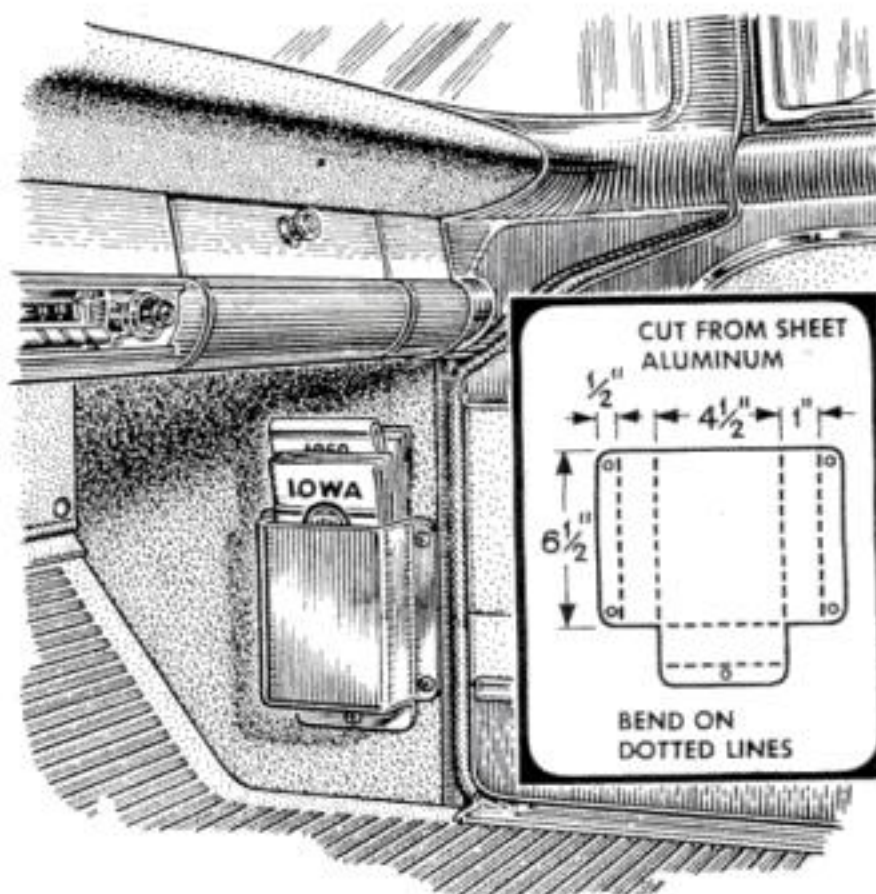
Kodak
TRADEMARK



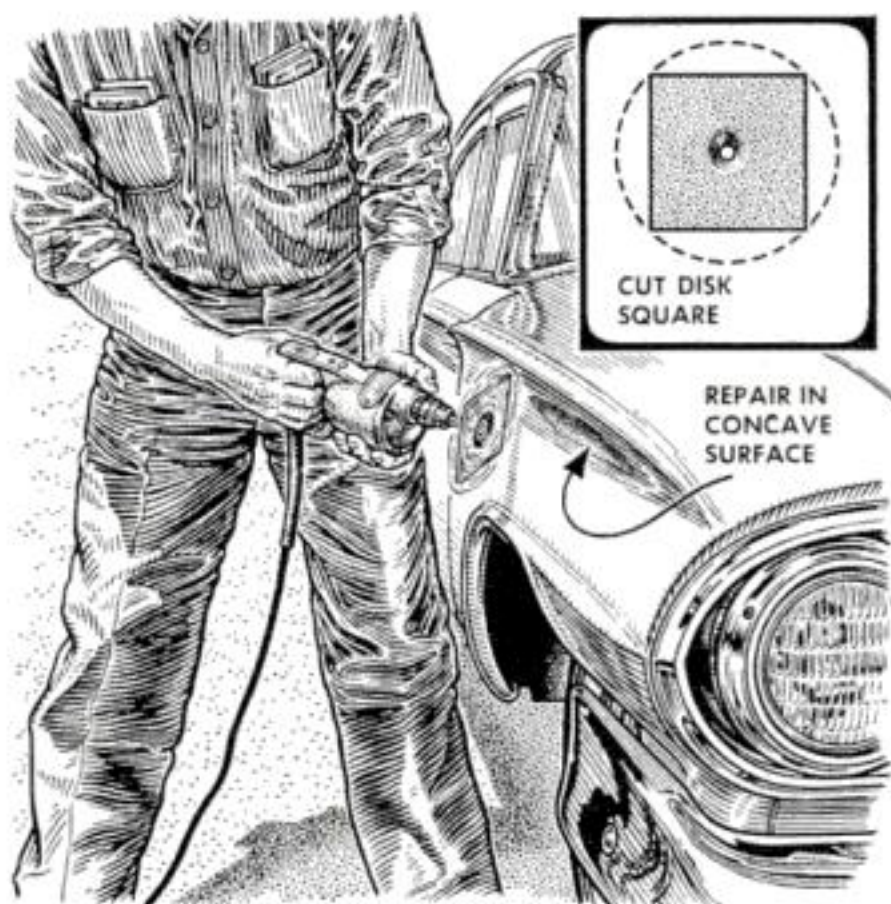
Hints from the Model Garage



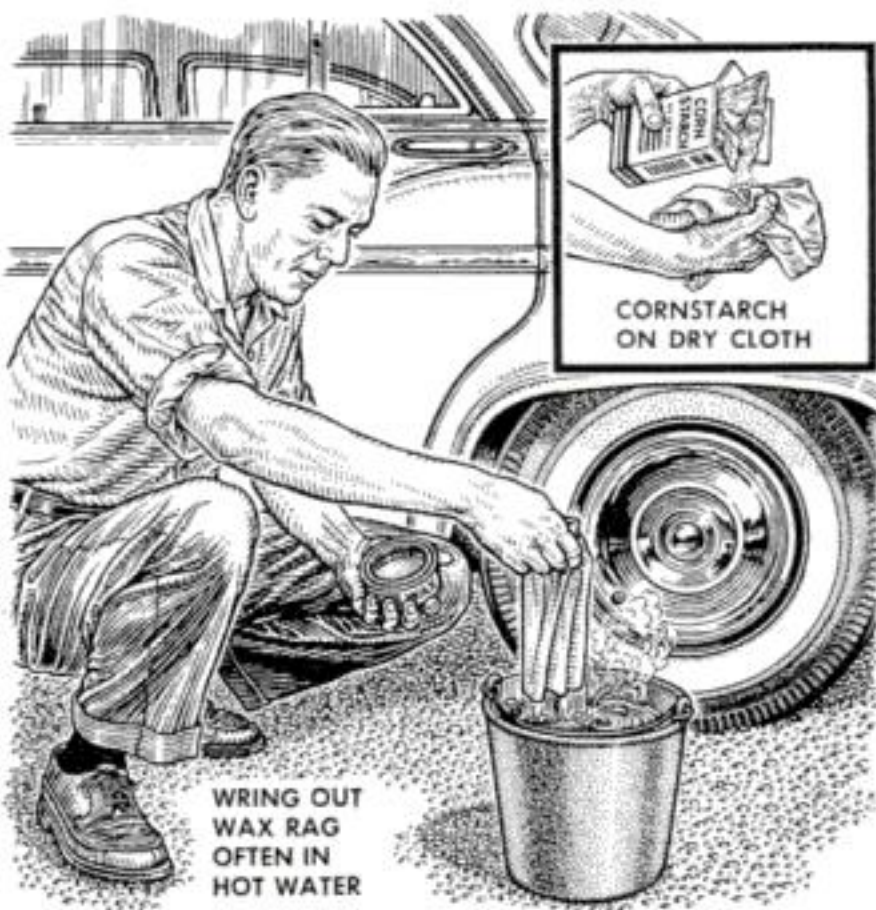
Next time you replace a wiper hose, use clear-vinyl tubing instead of the usual rubber hose. The vinyl won't dry out from heat or soften if oil gets on it. Also, if you see oil in the tubing, you'll know the fuel pump is going bad.



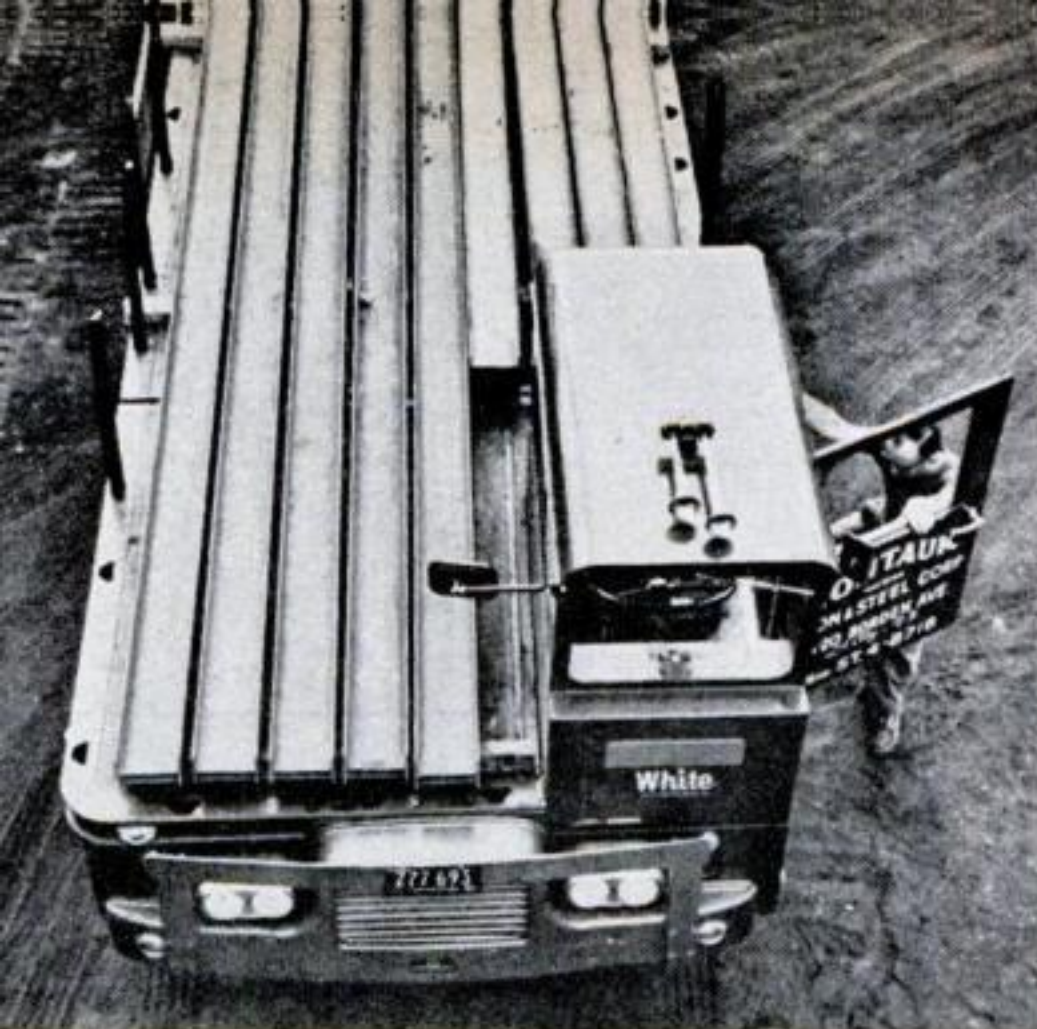
Store road maps in a small container screwed to the cowl paneling, and there'll be more room in the glove compartment. Cut the box from do-it-yourself aluminum sheet with household scissors. Bend it along the dotted lines.



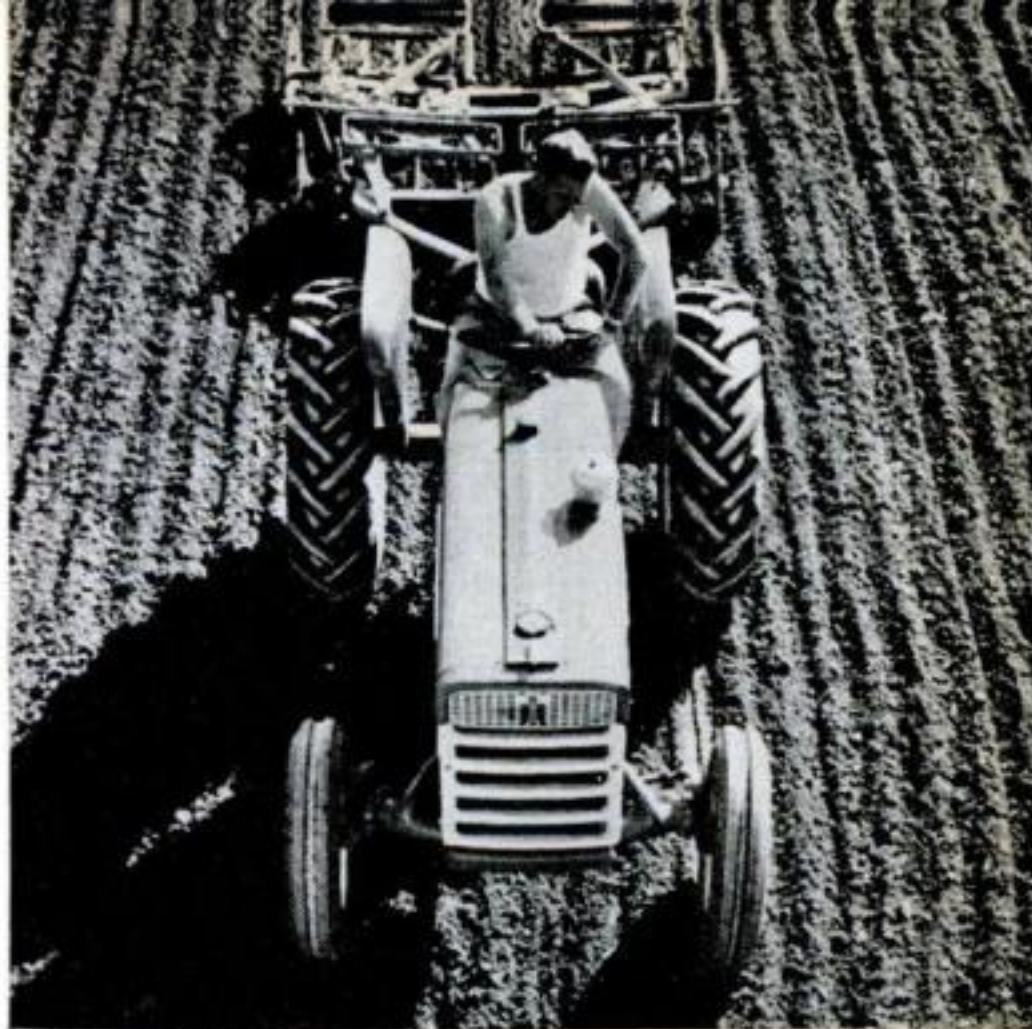
To avoid gouging concave surfaces with the edge of a portable disk sander, cut the disk into a square shape and mount it on the pad. Cutting action is lessened at the corners, yet the disk remains fully effective at the center.



To take the work out of car waxing, wring the wax-applicator cloth in hot water often. The heat makes the wax easier to spread. Shake cornstarch powder on the cloth used for final polishing: It acts like a mild buffing compound.



*17 out of 21 U. S. truck makers
specify Champions . . .*



*Every major U. S. tractor maker
specifies Champions . . .*



*Every major U. S. small-engine maker
specifies Champions . . .*



*Over twice as many car manufacturers
specify Champions.*

Q.

Why are Champion spark plugs overwhelming favorites with men who design and build engines?

A.

Because they know they can depend on Champions to deliver every bit of performance they've built into their engines. Your car will perform better (and save on gasoline) with new Champions. Put in a set every 10,000 miles!

*Worn spark plugs waste lots of gas—
so check your plugs every 5,000 miles!*

CHAMPION

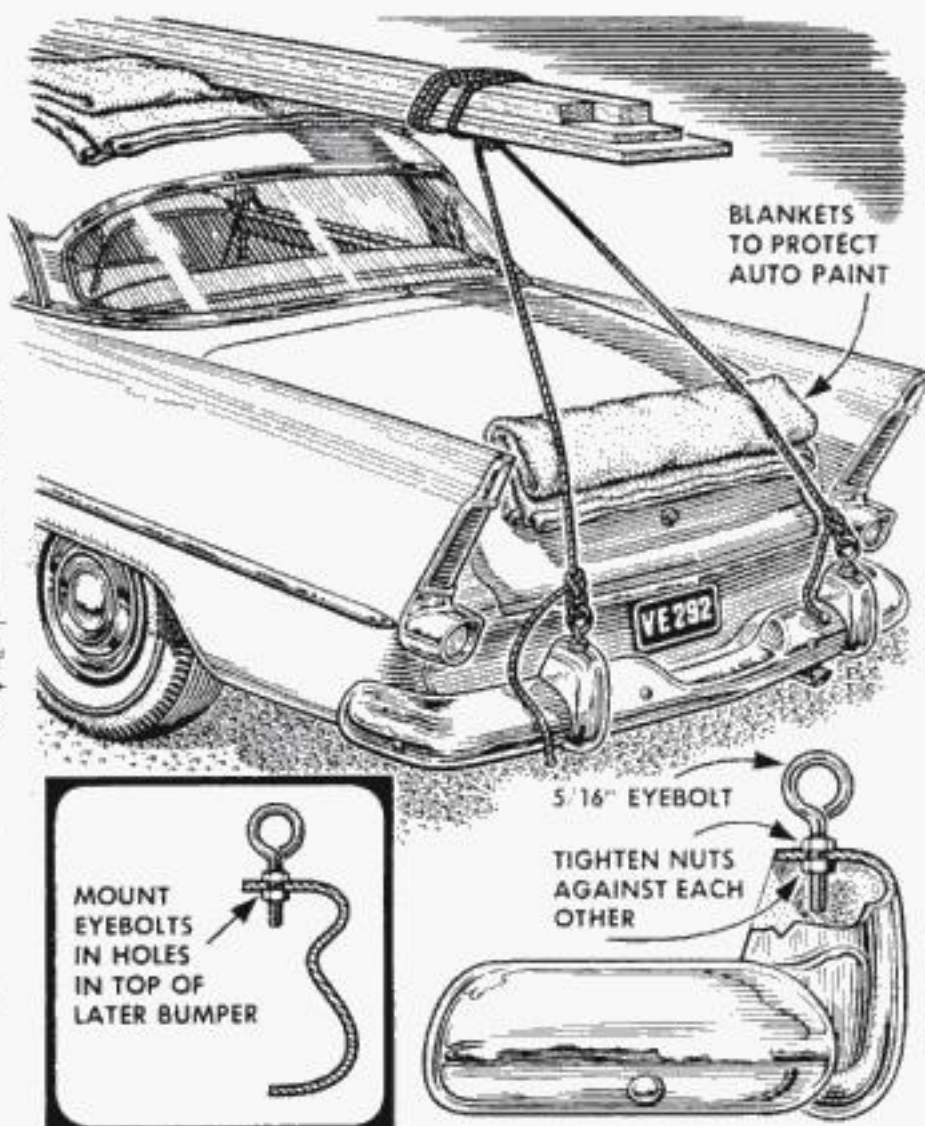


Copyrighted material

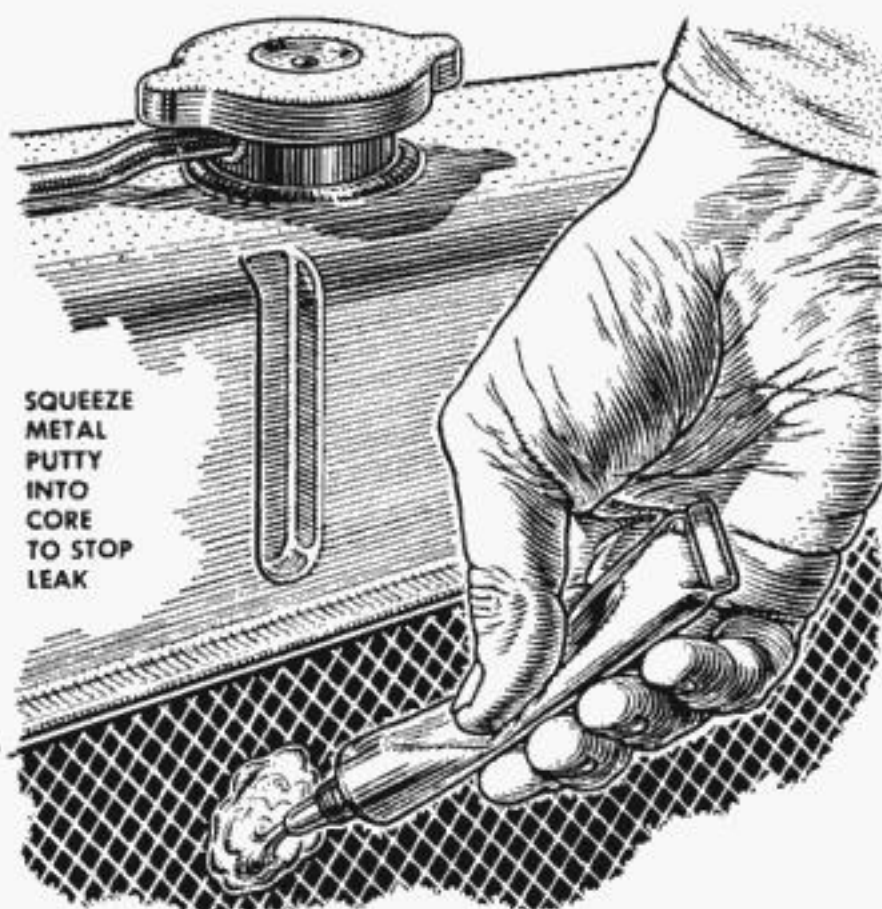
More Hints from the Model Garage



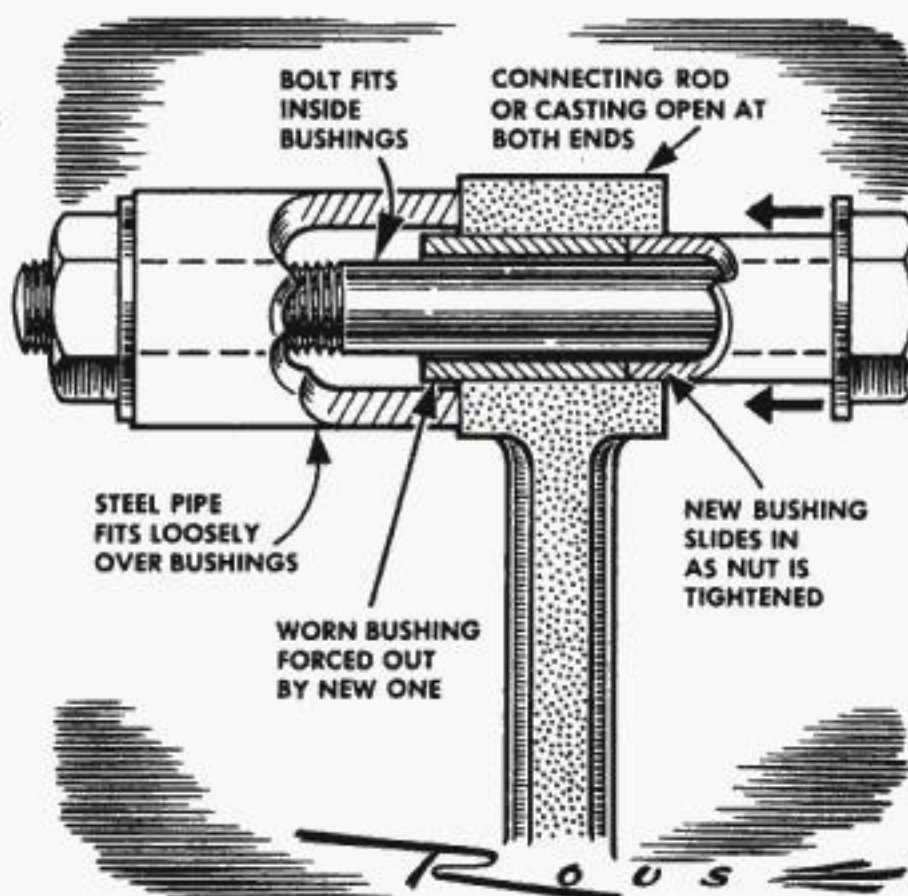
For adding water to a battery, you can't beat the convenience of an old hot-water bottle with hose attachment. Hang it filled on the wall adjacent to the hood of the car and release the hose valve to dispense the right amount of water.



You can tie down loads hauled on the roof of your car safely and conveniently by installing eyebolts on the front and rear bumpers. Drill holes in the bumper or bumper guards and lock each eyebolt in place with two nuts.

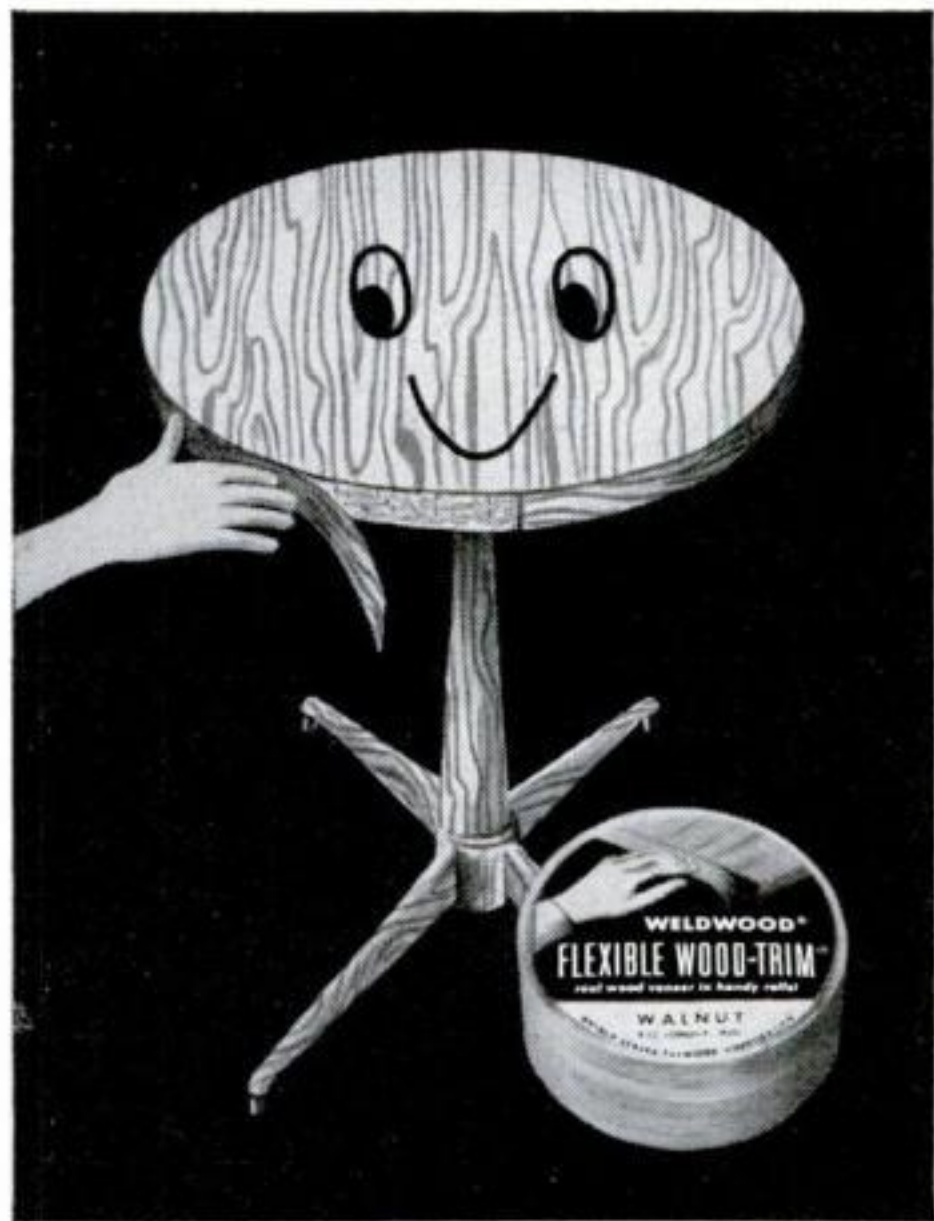


A leak in a radiator can be stopped easily by completely filling the faulty core cell with metal-patching putty or epoxy glue. This won't affect the radiator's efficiency, and it's quicker than trying to locate and solder a pinhole.



To install a new bushing quickly in any casting that's open at both ends, try the setup illustrated above. Tightening the nut causes the bolt head to pull the new bushing into the hole. At the same time it forces the old bushing out.

3 secrets of professional woodworking—by Weldwood



**1. Hide rough edges with
WELDWOOD FLEXIBLE WOOD-TRIM**



**2. Bring out wood's beauty with
WELDWOOD SATINLAC**



**3. Protect the finish with
WELDWOOD PASTE WAX**

WELDWOOD® FLEXIBLE WOOD-TRIM®, real wood, paper-backed, in handy 8' rolls. For edging plywood, lumber. Comes in 6 different woods. Apply with Weldwood Contact Cement or Presto-Set® Glue.

WELDWOOD SATINLAC®, self-sealing finish gives glowing, soft-sheen luster, brings out the wood's natural beauty without "plate glass" shine. For extra-light finishes, use first coat of Weldwood Satinlac Lightener.

WELDWOOD WAX is a rich, high-carnauba paste. It's quick, easy, self-cleaning—puts the finishing touch on lasting wood beauty. Resists water spotting, won't harm wood, protects as it beautifies.

WELDWOOD—the people who *know* what's good for wood . . . makers of world-famous Weldwood prefinished wood paneling.



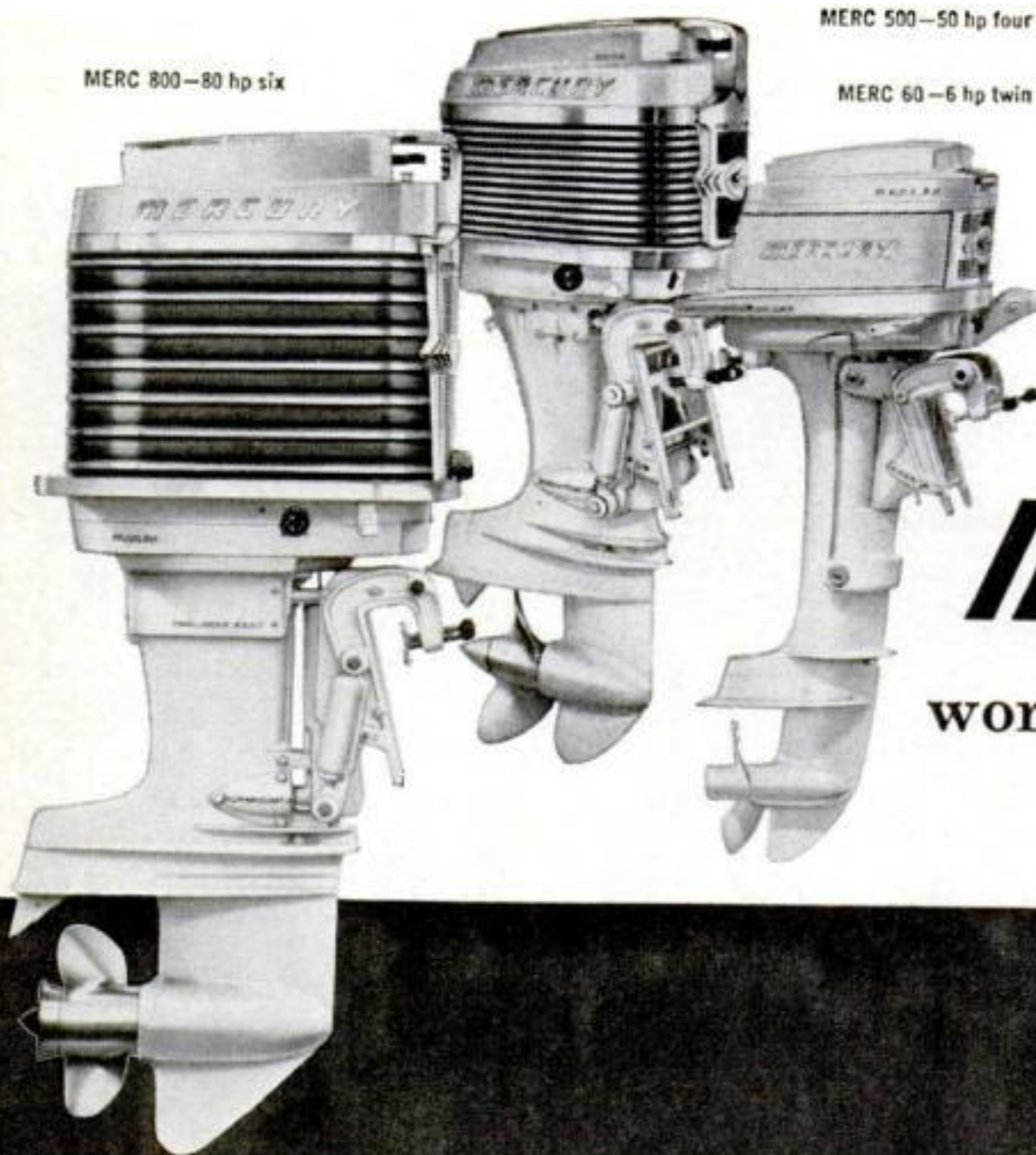
Products of United States Plywood

Your '61 MERCS are here!

MERC 800—80 hp six

MERC 500—50 hp four

MERC 60—6 hp twin



The motor that
started it all
...leads them all

MERCURY

world's No. 1 outboard!

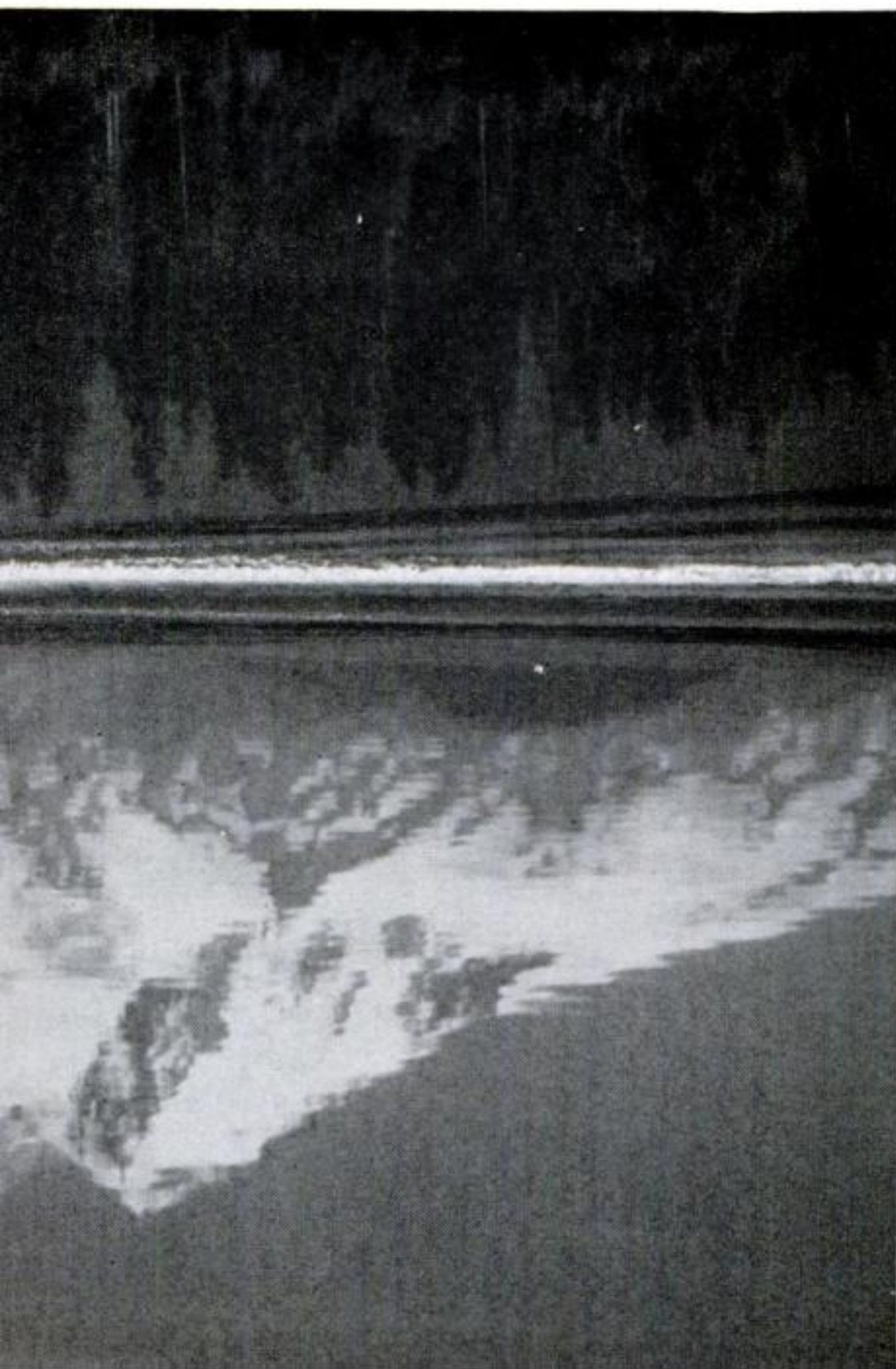
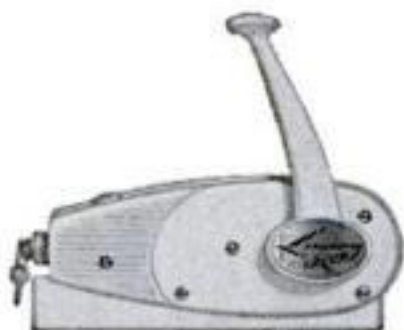


Only 12 years ago Mercury introduced the 10 hp "Lightning". It blazed a new trail for the outboard industry, sparked a family recreational revolution, cracked the inboard monopoly in cruising and skiing power.

The industry's old heads had dismissed the idea of family outboarding, or of a market for motors larger than 7½ hp, when Mercury's "Lightning" struck its new concept: (1) More power, not less; (2) More compactness, less weight and bulk; (3) More durability, with slower-moving, smaller, tougher reciprocating parts; (4) More advanced engineering, using proved aircraft and automotive design principles. Mercury leadership helped boat builders design roomier, safer boats to make family outboarding a reality . . . helped to make water skiing a national sport.

Today, other outboards have "caught on" to Mercury's concept—but *they haven't caught up!* The motor that started it all, leads them all! See 1961 Mercury and you'll know why.

One lever, one hand, controls throttle and shift with running neutral in every horsepower class—6 to 80 hp! Exclusive with Mercury!



All new for '61

80 hp MERC 800

WITH FULL GEAR SHIFT
AND SIX CYLINDERS

50 hp MERC 500

MOST POWERFUL IN
MERC 4-IN-LINE HISTORY

6 hp MERC 60

MOST ADVANCED OF
ALL FISHING TWINS

Exclusive Mercury 6-in-lines—80 hp Merc 800, 70 hp Merc 700.

World's most powerful family outboards! Choice of two single-lever power control systems: full gear shift lower unit, for those who prefer running neutral; Mercury's exclusive direct-reversing engine, which eliminates shifter clutch, reverse gear and shift mechanism from lower unit. Sixes feature: Jet-Prop drive fires exhaust gases through propeller hub, improves performance, submerges sound and fumes; economy throttle linkage yields up to 50% more mileage at cruising speed; shock absorbers minimize impact effects of submerged or floating obstacles. The auto industry trend is to 6-cylinder-in-line engines for economy, light weight, compactness; in outboards, *only* Mercury builds sixes!

Exclusive Mercury 4-in-lines—50 hp Merc 500, 45 hp Merc 400, 40 hp Merc 350.

Outboarding's most proven fours start you water skiing and cruising! Full gear shift with running neutral, single-lever remote control. Shock absorbers available on Merc 400 and 500 to increase outboarding safety. One of the best outboard buys ever!

Exclusive Mercury Glide-Angle Twins—22 hp Merc 200, 9.8 hp Merc 100, 6 hp Merc 60.

Automatic transmission (Merc 200 and 100) combines forward-neutral-reverse shifting with twist-grip throttle. All-new Merc 60—lightest fishing motor for its performance—has full gear shift with forward-neutral-reverse lower unit. Twins feature: slanted design glides over rocks, through weeds; Jet-Prop drive; single-lever remote control, Ride-Guide steering available. The Merc 60 is the most modern of light outboards . . . a real honey!

Write for **FREE CATALOG**

©1960

Kiekhaefer Corporation
Fond du Lac, Wisconsin



Gus removed the dip
stick to inspect the oil on it.
"That's not what I'm paying for,"
growled Kenquist. "Don't need oil."





Gus Straightens Out an Average Driver

By Martin Bunn

A LEAN, lantern-jawed, somberly dressed man got out of the station wagon at the Model Garage.

"Name is Kenquist," he told Stan Hicks. "I want the engine tuned up. It's sluggish. And lubricate the car, too."

"Yes, sir. Shall I change the oil?" asked Stan.

The lantern jaw set. "No! I want no oil drained, changed, or added."

"Sorry—lots of customers want an oil change with a lube job—"

"I don't!" snapped Kenquist. "And I'm tired of people who try to sell me high-priced oil I don't need!"

"But I only—" faltered Stan.

"Have the car ready by five," said the

customer, and stalked out of the station.

Returning from lunch, Gus found Stan moodily busy. He'd lubricated the car; now he cleaned and regapped the plugs, set the points with a dwell meter, checked compression, and serviced the air cleaner. Only when he dropped the hood did Gus go over.

Gus listened to the smoothly idling engine. "Nice and quiet. Got us a new customer, have you?"

Stan's face clouded. "Sort of a creep, Boss. Bit my head off when I asked should I change the oil, although it's black as tar on the dip stick."

"What's the last oil-change mileage on the service sticker?"

Stan shook his head. "So help me, Gus, he's got lube stickers for 10,000 miles

CONTINUED

211

back—but not one for an oil change. Maybe he pulls 'em off."

"It takes all kinds, Stan. Better do exactly what he asked for."

Stan nodded. "I did, but I wonder if it's what he needs? Maybe a road test—"

"Not necessary if you've done the work right," rasped a strange voice, as Kenquist appeared at Stan's elbow.

About to speak, Stan thought better of it. Gus turned away, uneasy but reluctant to interfere. He watched Stan make out a bill and take Kenquist's money. At first touch of the starter, the engine swung into a smooth idle.

"Hope I've seen the last of him," mut-

"Worse—same owner," said Stan, flinging the hood up. "I've checked, tuned, and fine-tuned it. It idles fine, but at road speeds has a 1908 Maxwell's pep."

"How about valve clearances?"

"Gosh, no, this is the *quietest* engine—but I guess I better. Oh-oh!"

The cranelike figure of Kenquist shadowed the shop door. As he approached, Gus took the drop light and peered hard at the engine. Then he removed the dip stick to inspect the oil on it.

"That's not what I'm paying for," growled Kenquist. "I tell you I don't need any oil."

"Seems not," said Gus. "That's only a small leak as yet."

"An oil leak? Where?"

"Around this valve cover," said Gus casually. "Shall we check the gasket and install a new one if necessary?"

Kenquist nodded. With four eyes on him, Stan loosened the two valve-cover bolts. He grunted softly in astonishment as the cover seemed to rise under his hands. Gingerly he lifted it off.

"Wow! No wonder these valves were quiet!" marveled Stan.



tered Stan as the wagon slid into traffic. "But I've got a hunch I haven't."

HUNCH or not, Stan was dismayed when the car rolled back in the next day, and Gus was again out.

"It's still sluggish," rasped the lantern-jawed driver. "I like to get what I pay for."

"Sorry, Mr. Kenquist. If only you'd let me road-test it yesterday—"

"Do it today. And this time see that you find the trouble."

The somber figure stalked out. Stan proceeded to double-check point setting, timing, and carburetor-float level; made sure that the fuel pump and automatic choke were working right; installed a new condenser. As soon as Gus returned, Stan took the wagon out.

When he returned, his expression was so unhappy that Gus could hardly keep a straight face. "Same car, Stan?"

THICK black sludge merged push rods, valve springs, and rocker arms into one gooey mass. Kenquist stared.

"What's that stuff?" he asked.

"Sludge," answered Gus. "You do much hard driving, Mr. Kenquist?"

"None now. Used to, when I was a salesman. Now I only drive between home and office. Say, is this as bad as it looks?"

"Maybe not," said Gus. "But you can see why the valves couldn't work freely at high speed. We'll have to take down the engine, soak and clean parts, blow out oil passages, see if there are stuck rings or worn bearings. Come sit down while Stan checks a bit further."

"I don't understand it," said Kenquist as he sat down in the office. "For a year I've driven only around town. My trips average three or four miles each."

"When do you change oil?" asked Gus. Kenquist colored, some of his aggres-

Cardiograph of Power!



Pre-ignition Meter Shows Superior Performance of ACs

This AC engineer is tuned in on the heart-beat of an engine. He's using a special AC pre-ignition meter to check spark plug performance. Here, the meter shows all eight AC Spark Plugs are firing perfectly. This electronic instrument senses the combustion chamber temperature in each cylinder. If dangerous, engine-damaging pre-ignition occurs, the temperature rises sharply. The

sensitive meter connected to the cylinder, records the change. The needle moves over to the danger zone. This is just one of hundreds of proving ground and on-the-road tests that AC engineers perform to make certain that the spark plug recommended for your car gives you the best possible performance. When you replace spark plugs . . . at 10,000 miles . . . ask for ACs and be sure.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS



Fire-Ring



Spark Plugs

THEY MUST BE THE BEST!

siveness returning. "The manual recommends every 4,000 miles of average driving. I did that when I was making long trips. Now I wait longer."

Gus's eyes widened. "Because you make only short runs?"

"Sure. Servicemen want me to change oftener, but that's oil-company propaganda. Oil doesn't wear out."

"Not while it's oil," admitted Gus. "But what's that stuff in your car?"

Startled, Kenquist said nothing.

"Car makers," said Gus, "stretch the oil-change interval as long as they dare. The joker is that 'average driving' the manual mentions."

"Mine is even less than average."

"Funny thing," remarked Gus. "Everybody thinks he's an average driver. But your kind of driving—the kind most people do nowadays—isn't average. It's worse."

Kenquist's eyes narrowed for an argument. "You can't tell me easy trips are harder on a car than long ones."

"I do," returned Gus. "Today's big engine is powered—and cooled—for turnpike travel. On short trips it hardly warms up. The engine loafs, but the oil is overworked."

"I don't see it," said Kenquist. "How do you figure that?"

"For every gallon of gas it burns, your engine forms about a gallon of water," Gus explained. "Some combines with combustion gases to make acid. A hot engine vaporizes most of those wastes through the breather and muffler. A cold one lets more get into the oil."

"Automatic choking at every cold start shoots in raw gas. Some washes down the cylinder walls, dilutes the oil. Besides that, an engine running cool and rich

forms more soot and other sludge makers."

Kenquist grunted. "If that's so," he said grumpily, "it's a wonder a car keeps running at all."

"Modern oils help," explained Gus. "They have additives that neutralize acids, disperse sludge, keep dirt in suspension. But they can't work forever. When those chemicals are neutralized, you have to dump old oil like dirty dish-water—and for the same reason."

Stan came in, fastidiously wiping a wrench. "The lifters are all sludged up, too. Half the valve clearances are way out—they'd have been plenty noisy except for the gunk."

"I think we can promise you a livelier engine when it's cleaned up and re-adjusted, Mr. Kenquist," said Gus.

"Okay, I'm convinced. Go ahead."

"But you'll get sludge again," warned Gus, "unless you change oil much oftener for stop-and-go driving. In cold weather, I'd leave the heater off for short trips, to warm the engine faster."

"Guess I'll have to. No use paying you for a lesson if I don't learn anything by it."

"ALWAYS did want to take one of these engines apart," said Tom, standing beside his Volkswagen. "There are the pieces." He nodded at a boxful of con rods, push rods, cylinder heads, and other engine hardware.

"Don't forget to put back those eight pieces of wood you took out," remarked Pete.

"Wood?" asked Tom. "You kidding?"

"No. In every VW engine there are eight pieces of wood. They're in the box."

"There's nothing but ironmongery in that box," protested Tom. "You've got to be kidding."

"Only about forgetting to put them back," answered Pete.

...How Come?

ANSWER: The push rods are hollow, to feed oil to the rocker arms. To keep rod weight low, the channel is made large. But if this were full of oil, the fluid might set up bounce by surging. So a slender hardwood stick, round in cross section except for two flat-tened sides that allow the oil to pass, is placed in each channel. In most engines, the rod ends are left on, so the wood is not seen.

MUCH relieved, Stan watched his difficult customer march out.

"With that personality, what could he sell? Dynamite?"

Gus chuckled. "Could be."

"He got more good advice than he deserved. Boss, if you keep telling people how to duck repair bills, what'll happen to our business?"

"Nothing. The law's on our side."

"Huh? How's that?"

"There are so many 'average' drivers," explained Gus, grinning, "that we can depend on the law of averages."

BETTER BALANCE
AND CONTROL

50% MORE
SANDING SURFACE

BETTER TITE-
GRIP SANDPAPER
HOLDER

New B&D Finishing Sander cuts sanding hours to minutes

Black & Decker's NEW action-packed U-66 Finishing Sander has a 50% larger sanding area for faster sanding and refinishing. Professional type king-size platen, feather light control and broad-shouldered B&D power make it a natural choice for jobs rough or fine . . . for heavy-duty removal or fast refinishing.

You get easier handling from natural grip handles positioned over the work for accurate control. You get positive paper clamp which locks and *stays* locked. You get instant release trigger switch—with locking pin—and 3-conductor cable and plug. You get one of the lightest, most compact units on the market—and famous B&D power, dependability and durability.

Black & Decker offers the widest selection of sanders and features on the market. Prices start at only \$29.95. For free catalog, write: THE BLACK & DECKER MFG. Co., Dept. E-100, Towson 4, Md.

B&D U-440 Utility Sander. Power-sanding economy in initial cost, in hard work, in time savings.

Dust-Less Attachment. Dust-Less Attachment equips any B&D Finishing Sander for clean, dust-free operation.



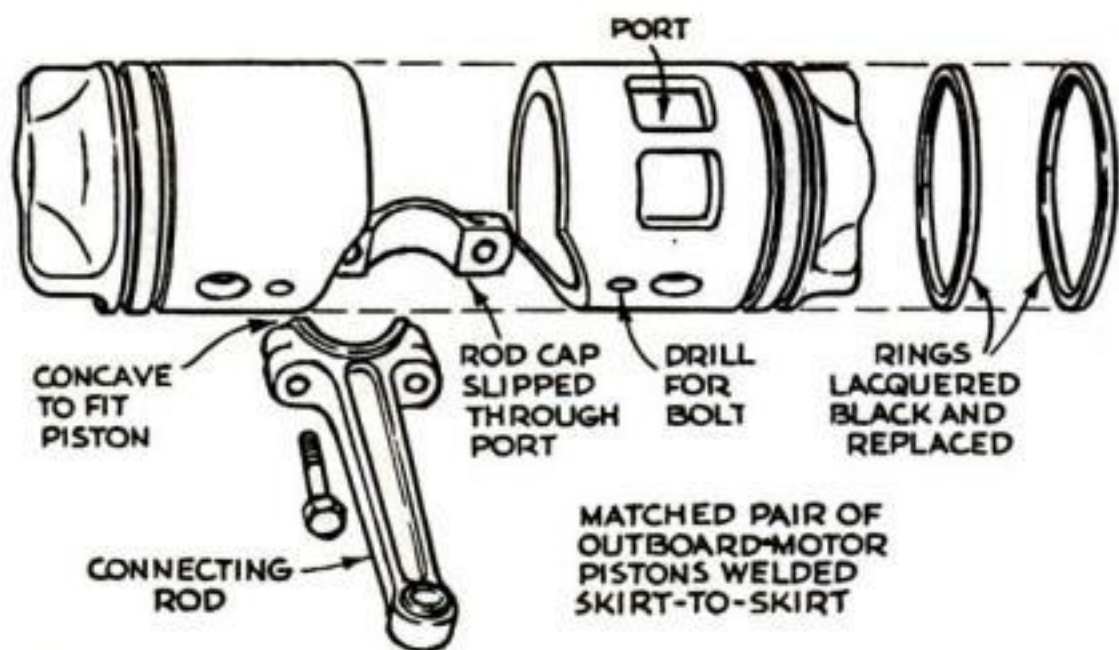
Black & Decker®

WORLD'S LARGEST MAKER
OF POWER TOOLS



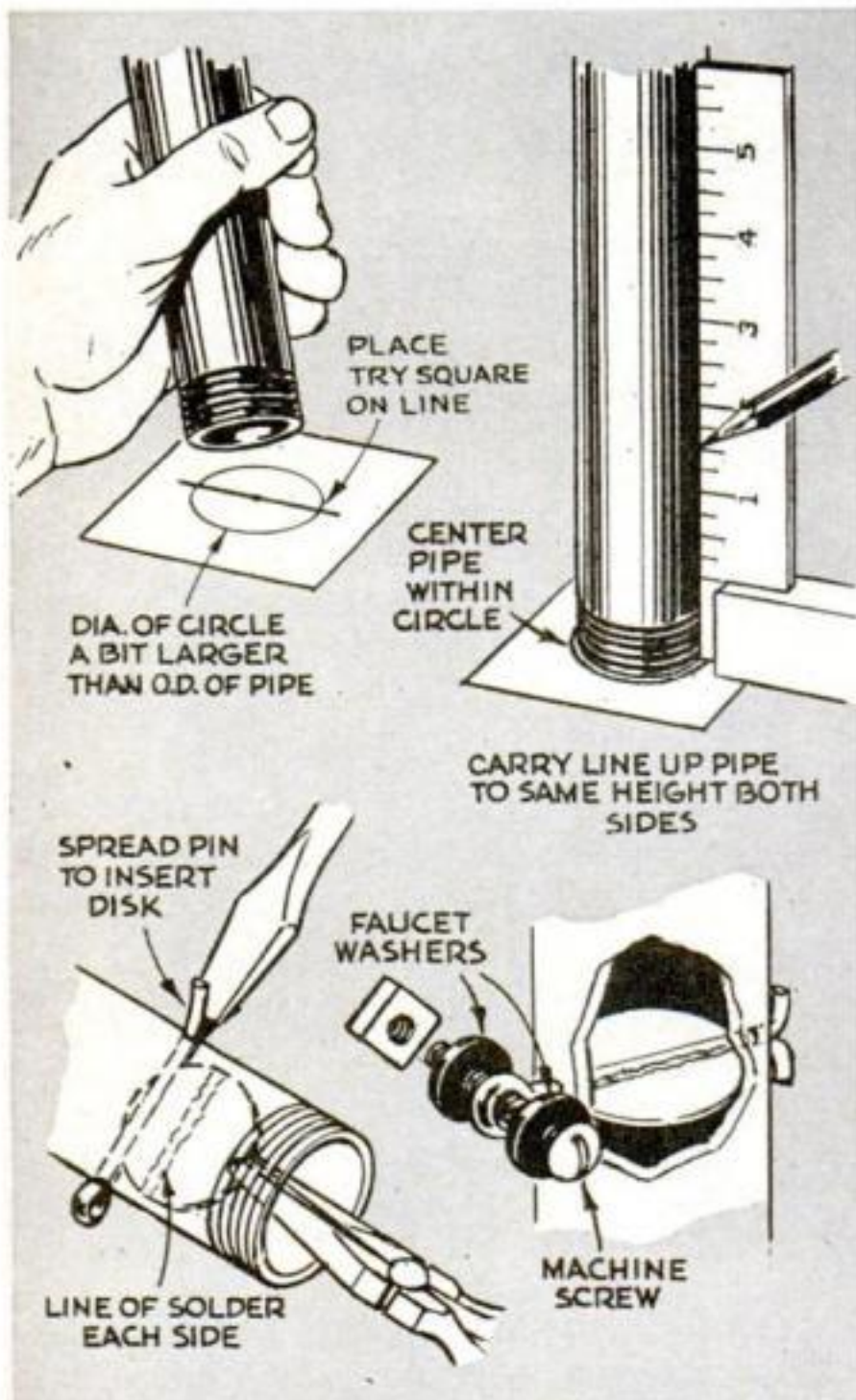
Short Cuts and Tips

FROM PS READERS



Gavel from Outboard Motor Parts

WHEN the president of our Outboard Club needed a gavel for business meetings, we presented him with one appropriately formed of salvaged motor parts. It was made by bolting a connecting-rod handle to a pair of pistons that had been welded together, with the seam ground smooth. The rings were removed, sprayed with black lacquer, and slipped back in place over a paper sleeve to prevent scratching. Before the rings were replaced the rest of the gavel was gilded. A decorative lanyard of $\frac{1}{4}$ " nylon line, spliced through the end of the handle, added a finishing touch.—Capt. Jeremiah B. Whittaker, Essex, Conn.



Drilling a Pipe for a Damper

I NEEDED a shut-off in the $1\frac{1}{4}$ " iron pipe connecting a second-hand heater to my car's defroster. A tin disk and a 2" cotter pin served for the damper, but I had no drill press and V block for boring two centered and aligned holes in the pipe. I drilled the holes independently, locating them with a layout on paper.

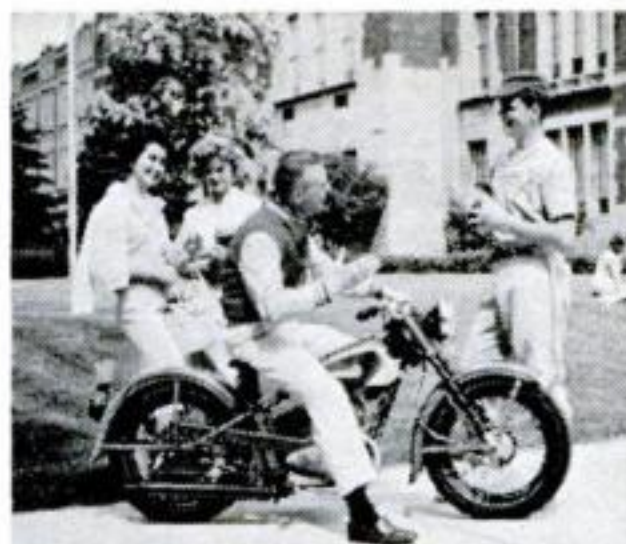
From a point on a straight line, I scribed a circle slightly larger than the pipe's circumference. I centered one end of the pipe in this circle and used a square to carry lines up the pipe where the line intersected the circle. Measuring up each line the same distance from the end, I established center points opposite one another. I laid a diameter line of solder on each side of the tin disk and ran a little solder along the pin before inserting it through the pipe. Centering the disk in the pin, I applied heat to sweat the pieces together. For a handle, I bolted washers to the eye as shown.—E. R. Hickman, Grand Rapids, Mich.

▶▶▶ BUILDING workbench supports or tool stands out of pipe? Increase rigidity and cut down vibration by filling the pipe with cement.—Harry Ramsay, Jackson, Mich.

RIDE THE SUNNY SIDE OF THE STREET!



DELUXE DUO-GLIDES
— world's finest motorcycles



SUPER-10
— most economical lightweight



SPORTSTER CH
— the active man's motorcycle



SPORTSTER H
— most versatile motorcycle



TOPPER — world's top motor scooter



THE NEW SPRINT
— a new class of motorcycling

Get on the beam in 1961 — get there on one of these *six* outstanding models. If your spirit is *wheeling*, you'll visit your Harley-Davidson dealer today. He has 1961 models on his floor ... easy-pay plans that fit your pocketbook. Or mail the coupon for this colorful new folder.

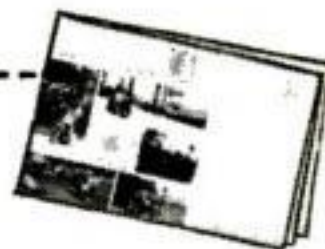
HARLEY-DAVIDSON MOTOR CO.

Dept. PS,
Milwaukee 1, Wis.

Send me the facts — how I can have more fun in '61 on a Harley-Davidson motorcycle.

Name Age

Address



HARLEY-DAVIDSON MOTOR CO., Milwaukee 1, Wisconsin

Short Cuts and Tips

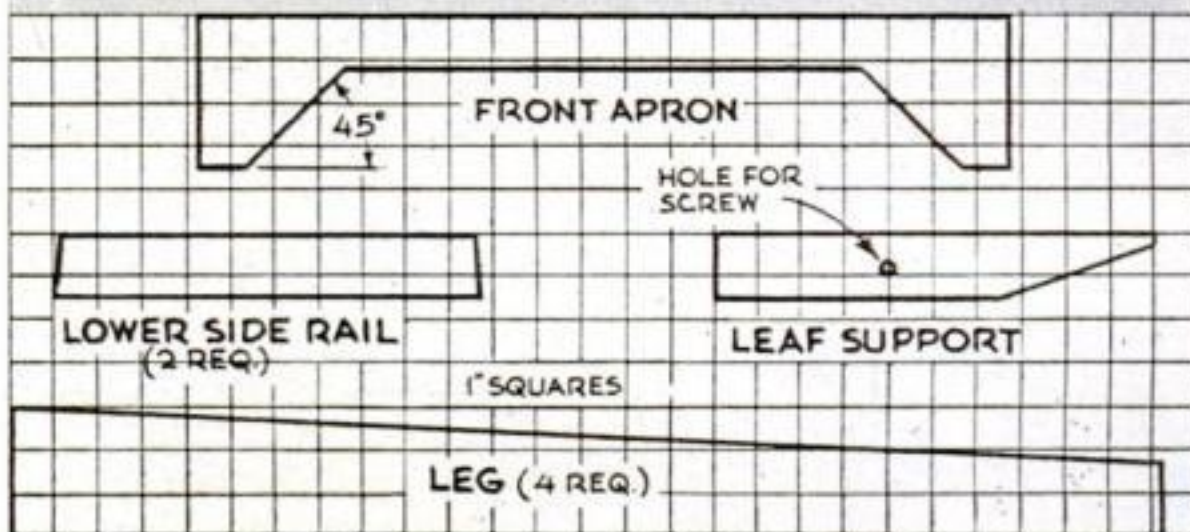
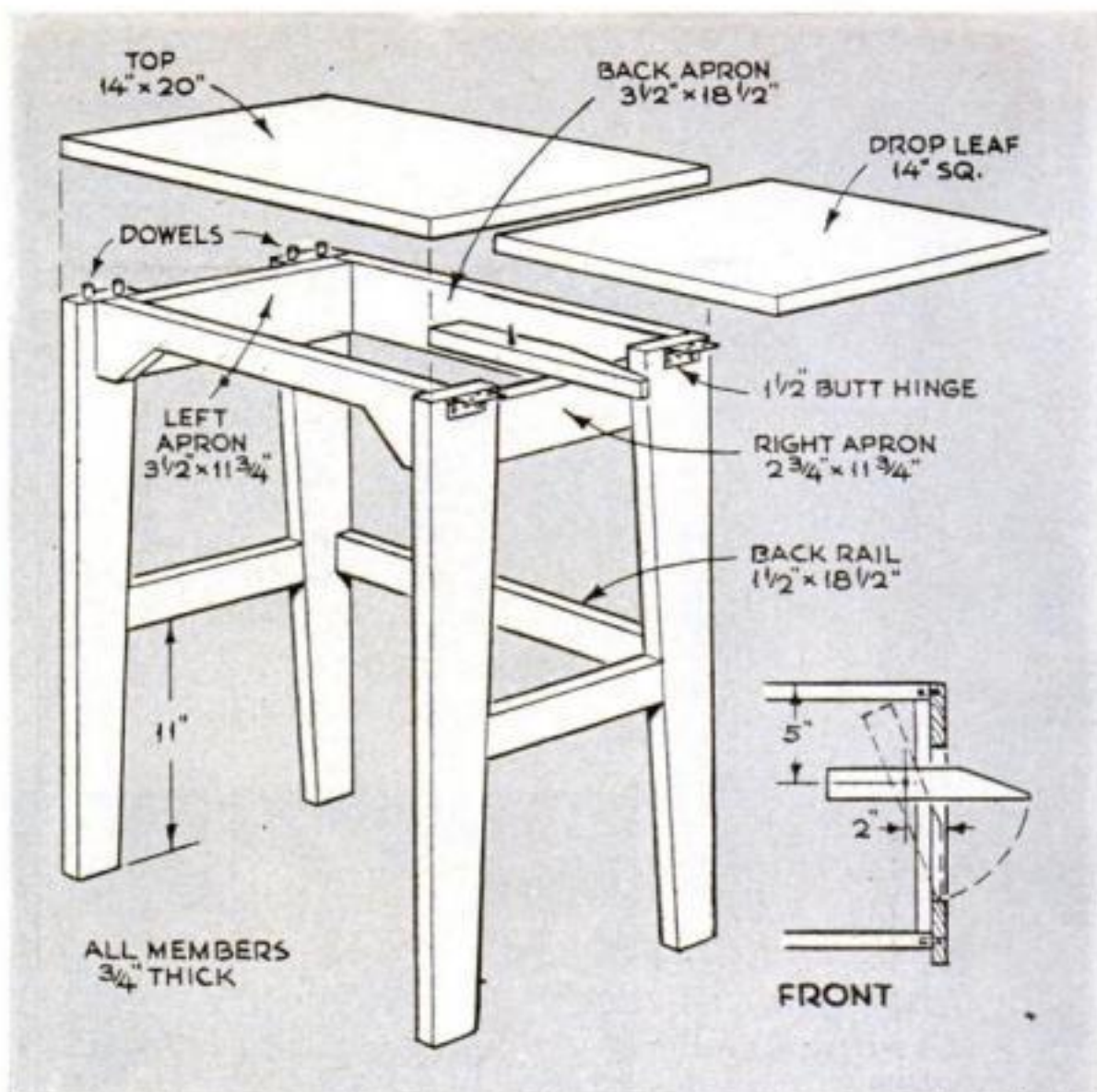
FROM PS READERS



An All-Wood Home Typing Stand

THIS typewriter table can be finished to match your other furniture, avoiding the office look associated with the metal kind. The top is 27" above the floor, which is the normal height for typing. The top and drop leaf are $\frac{3}{4}$ " plywood. The other members can be cut from the same plywood panel or, if you object to exposed edges, from 1" lumber (actual thickness about $\frac{3}{4}$ "). The back apron sets flush with the outside edge of the flanking legs but the front apron is recessed $\frac{3}{4}$ ". Join aprons and rails to the legs with dowel joints.

The side aprons are lapped and nailed; the one on the right is dropped to pro-



vide a slot beneath the top through which the leaf support projects. Outer faces and edges of the legs are flush with the edges of the top panel, which is attached to them by means of dowel joints. Glue should be applied to all butting surfaces, of course, before the parts are assembled. —D. E. Roetman, Dayton, Ohio.

Flanges Support Tent Poles

INSTEAD of putting wood blocks under the aluminum poles of my new camping tent to keep them from sinking into soft ground, I installed do-it-yourself aluminum floor flanges in the poles. The flanges are available at hardware stores



that sell aluminum stock. They come in three sizes that fit into $\frac{3}{4}$ ", 1", and $1\frac{1}{4}$ " tubing. —Ken Murray, Colon, Mich.

▶▶▶ BOTH horns on my year-old car went dead at once. I drilled out the rivets to open the housings and found that the trouble was rust. Each housing had an air vent at the top of the closed section to allow free diaphragm movement. Water could not drain out. I sealed the holes with metal putty and drilled new ones in the bottom of the housing. After cleaning the rust off and brightening the breaker points with emery paper, I reassembled the horns. Both worked fine. —Calvin N. LaFrence, Rock Island, Ill.



MODEL H75

**Heavy-duty sabre saw
only \$46.95**

PLUS 7 assorted blades worth \$4.90—FREE!

Fastest-selling heavy-duty sabre saw on the market! Cuts scrolls, curves, wood, metal. Special blades cut flush up to a wall and $\frac{5}{8}$ of an inch along a wall.



MODEL H131

\$5.00 off

on 3-amp. 1/4" drill!

now \$19.95 — Reg. \$24.95

Here's the most powerful $\frac{1}{4}$ " drill for the price on the market. Features rugged, balanced construction, nonslip pistol grip, 3-jawed geared chuck, 3-wire cord.

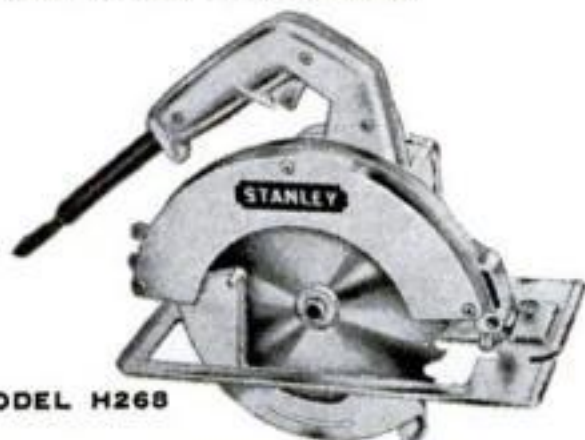


MODEL H37

**NEW! Stanley finishing sander
only \$34.95**

PLUS 2 packs of sanding sheets—FREE!

Sands and fine-finishes table tops, cabinets, bookcases and many other kinds of furniture. Ideal for small work areas.

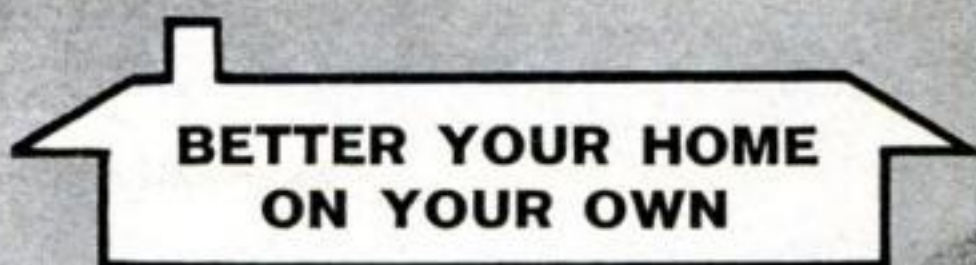


MODEL H268

**Stanley heavy-duty
builders saw
now \$54.95**

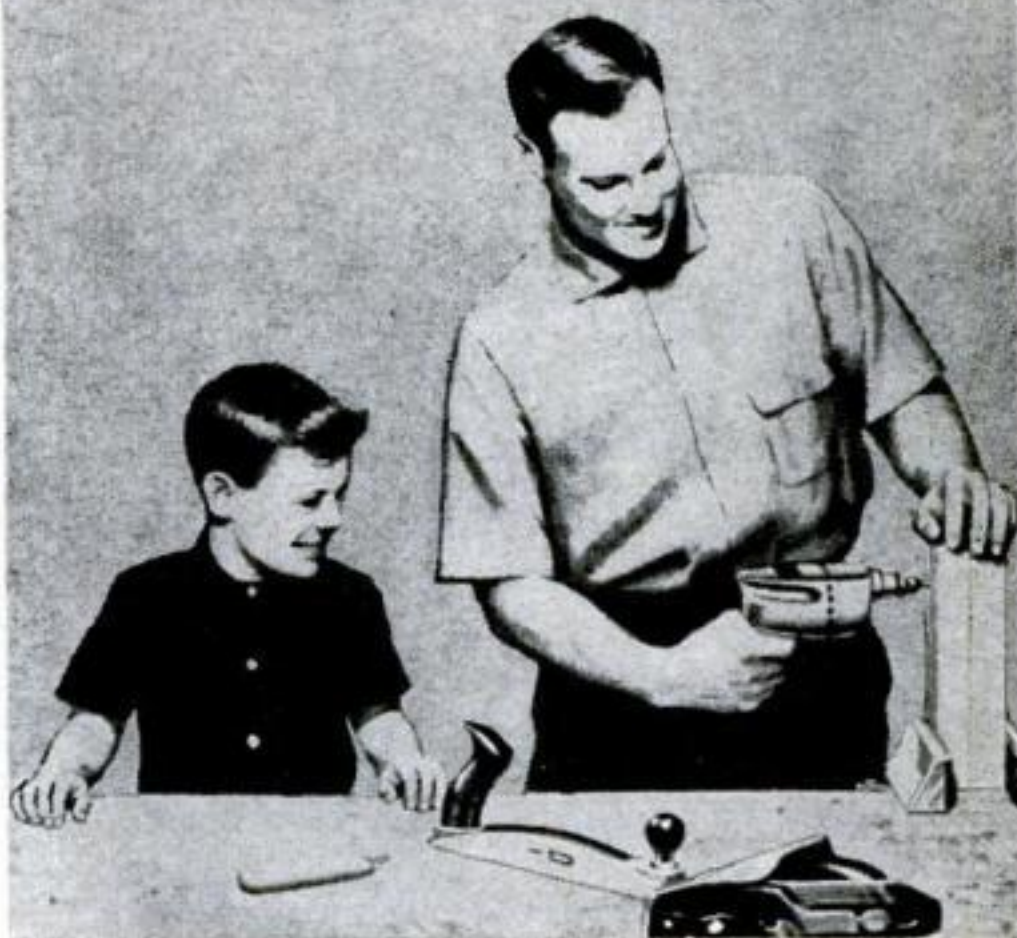
**PLUS—\$2.65 combination rip
and crosscut blade ... FREE!**

This 6 $\frac{1}{2}$ " saw lets you tackle any cutting job... a breeze-way, porch, playroom, fence! Features rear controls, exclusive "free-start" blade guard.



... with these time-saving

STANLEY FALL SPECIALS



NEW! bench grinder... only \$46.95

special introductory price

You save \$3.00 and get 2 grinding wheels, and 2 special tool rests, too!

$\frac{1}{4}$ hp, general purpose grinder. Perfect for sharpening tools, skates, removing rust—a "must" in your workshop!



MODEL H634

STANLEY ELECTRIC TOOLS

Div. of The Stanley Works
New Britain, Conn.

(Special offer ends Dec. 31, 1960.)

Prices slightly higher in Canada.
Subject to change without notice.
Canadian Plant: Hamilton, Ont.

STANLEY



Electric tools built for the professional, priced for everyone

SAVE \$

DELTA HOME

on two of the most useful



Basic tool in every wood-working job—the 9" Circular Saw delivers all the power and built-in precision you need for faster, easier, more accurate cutting. It offers big capacity for ripping, cross-cutting, mitering or beveling—plus extra operations such as dadoing and tenoning. It's the saw you'd want at *any* price—yours to start enjoying *now* at a big \$22.05 savings.*

Cat. No. 34-005 Delta Homecraft
9" Tilting Arbor Circular Saw
equipped with Extension Wings and
Steel Stand.

DON'T MISS THIS LIMITED TIME OFFER!

Hurry on down to your Delta Dealer (listed under "TOOLS" in the Yellow Pages) or visit your leading Department, Hardware or Building Supply Store soon.

SAVE \$

WORKSHOP SALE!

power tools you can own



You can use the new, improved Delta Dust Collector with almost any wood-working power tool for collecting dust and chips at the source—use it for general cleaning in your basement, attic, and garage—or use it for paint spraying and dozens of other jobs. You'll really appreciate the versatility and portability this unit provides—and even more, the \$10.00 you save* on it during this sale.

Cat. No. 49-576 Delta Dust Collector complete with motor and hose.

GET VALUABLE SHOP BOOK

Deltacraft hard cover book, GETTING THE MOST OUT OF YOUR CIRCULAR SAW, gives you 120 pages crammed with shop-tested ideas, photographs and drawings. Send check or money order for \$1.00 to: Rockwell Manufacturing Company, Delta Power Tool Division, 504K N. Lexington Ave., Pittsburgh 8, Pa.

**Prices and savings slightly higher in the West*

DELTA POWER TOOLS

another fine product by

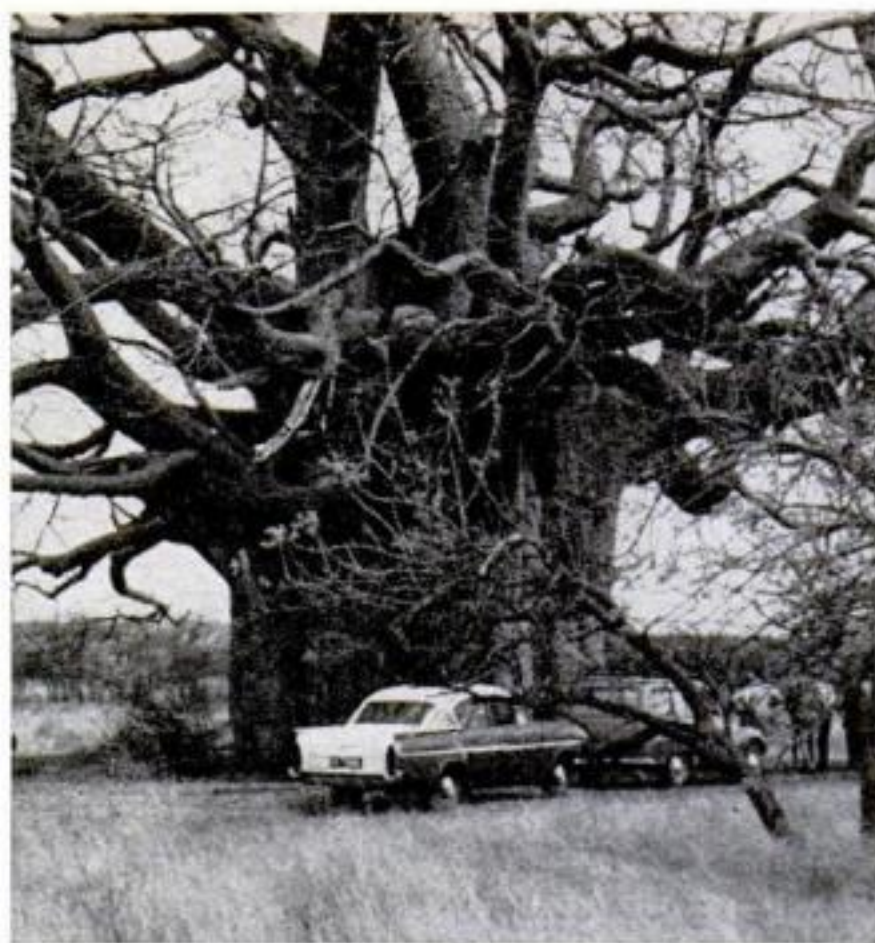
ROCKWELL





Square bottles for beer

"Prosit!" says the man as he pours beer from a new square bottle, introduced at the International Fair in Leipzig, East Germany. The maker claims that the square bottles take up less shipping space than round bottles. And they would enable Germans to store more of their favorite beverage in home refrigerators.



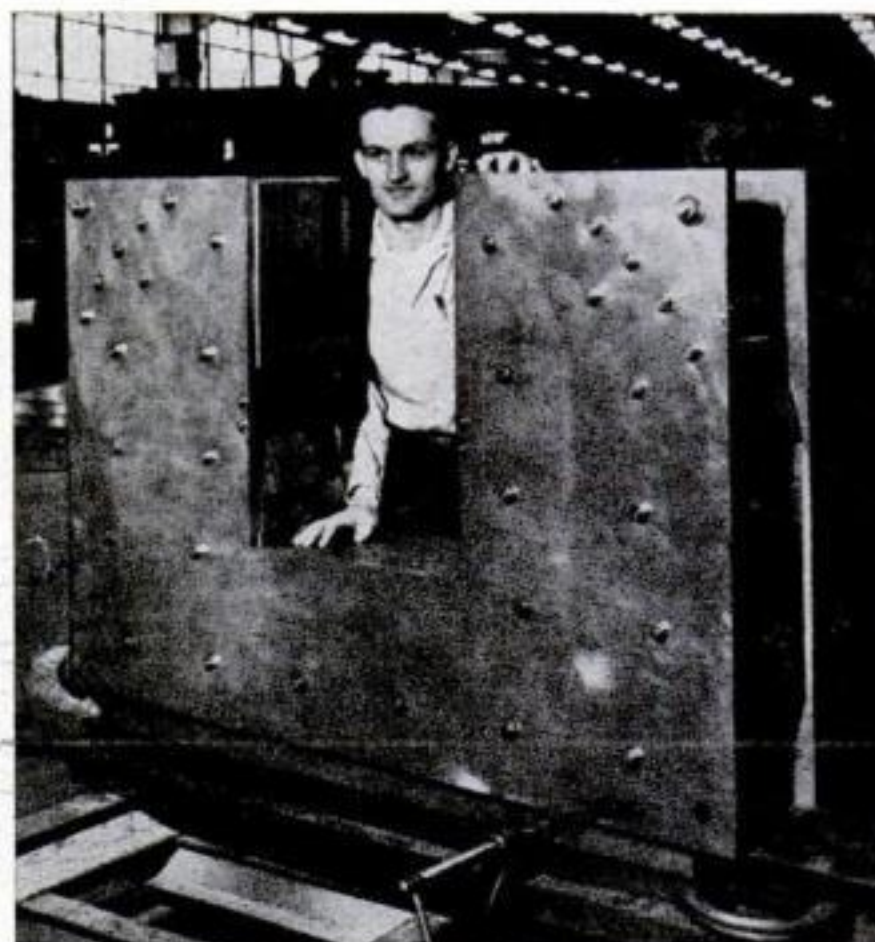
2,000-year-old tree

Tourists in the Union of South Africa flock to Tshipise to see this baobab tree on the farm of P. S. Vosloo. Believed to be 2,000 years old, the tree measures 65 feet around its massive trunk. Sight-seers have scarred it with carved initials. The baobab, valuable for timber, bears an edible fruit called monkey bread.



Shrinking rings

These powdered-metal cores are the smallest and largest used in electronic filters. One at left is only 0.26 inch in diameter. The filters help guide missiles and speed long-distance phone calls by screening out interfering radio frequencies. Arnold Engineering Co. reduced one core from 4 $\frac{1}{4}$ pounds to $\frac{1}{3}$ ounce.



Largest permanent magnet

Weighing 1,720 pounds, this Amico V magnet will pump liquid sodium in an atomic breeder reactor to be operated by the Argonne National Laboratory. The electromagnet customary in such cases can't be used here because the metallic liquid will surround it. Some 500,000 ampere turns magnetized the giant.

Tips from Weldwood—the people who know what's good for wood



**Kill termites, prevent rot with
WELDWOOD WOOD PRESERVATIVE . . .**



**Add lasting color to outdoor wood with
WELDWOOD EXTERIOR STAINS . . .**



**Seal and prime outdoor wood with
WELDWOOD FIRZITE . . .**



**Protect and beautify outdoor wood with
WELDWOOD SPAR VARNISH . . .**

WELDWOOD® WOOD PRESERVATIVE, essential where wood is in contact with earth, contains full 5% pentachlorophenol. **WELDWOOD EXTERIOR STAINS**, 4 beautiful "woody" colors: Redwood, Driftwood, Cascade Green, Sierra Brown. **WELDWOOD FIRZITE®**, a penetrating resin-sealer for fir plywood, pine, etc. Comes in *Clear* to prevent "wild grain" in stain jobs; and in *White*, a pigmented prime coat to combat checking in paint jobs.

WELDWOOD SPAR VARNISH, durable, high gloss exterior clear finish that resists discoloring even in severe weather.



Products of United States Plywood

STOP using too much OIL and GAS



worn out piston rings mean waste oil and gas...power drop-off...costly repairs to come

You can prevent excessive oil and gas consumption . . . restore your engine's lost pep and power . . . with a Hastings re-ring job.

The sooner you act, the less it will cost. See your motor specialist the minute oil-pumping warns you there's trouble ahead. When he says you need new piston rings be sure you get Hastings. They're engineered exclusively for replacement service . . . to provide the additional lubrication worn engines need . . . to stop oil pumping, save gasoline, restore lost performance.

Get new car power and performance from your present car—with Hastings. Truly your best investment for many thousands of extra miles of trouble-free driving pleasure.

TOUGH
on oil pumping
GENTLE
on cylinder walls



HASTINGS

PISTON RINGS

HASTINGS MANUFACTURING COMPANY
HASTINGS, MICHIGAN
Oil Filters, Piston Rings, Casite Additives,
Spark Plugs

How Birds Find Their Way in the Sky

[Continued from page 100]

miliar with, that is 10-20 m.p.h. If weather emergencies come up, however, they can sustain higher rates.

A massive duck migration once awed watchers in the Mississippi Valley in the fall of 1955. Spurred by a broad severe cold front, thousands of banded ducks flew from central Canada to Louisiana in two days. The distances ranged from 1,400 to 2,000 miles.

On the other hand, if birds find a particularly lush eating spot on the way, they often delay their travels. Far-Western ducks cause much havoc to rice fields that lie under their main migratory route through California. They spurn the enticements of federal and state refuges, convinced that nothing beats a water-laden field of rice. Farmers fight back with shotguns, sirens, and searchlights. Occasionally they even hire planes to buzz the birds.

Segregationists vs. fellow travelers. While ducks and geese stick to their own kind, a number of species flock together. Wood warblers will gang up with almost any other friendly birds. Blackbirds and swallows are equally tolerant.

Bobolinks and crows, however, are strict segregationists. Winter wrens and grebes, shrikes and belted kingfishers are fussier still. They won't even fly with others of their kind, but go it alone.

Similar variety exists in flying style and altitude. Ducks and geese are known for their rigid Vees. Barn swallows head south in flocks whose close-precision flying is as dazzling as that of the Navy's crack team of jet pilots. In contrast, bluebirds and warblers straggle like members of a crowd leaving a stadium.

Highest flyers are storks and cranes. Some have been spotted in the Himalayas at an estimated altitude of 20,000 feet. That would be impossible for most birds. The majority fly at around 3,000 feet or lower.

In clear warm sunlight when air currents are rising, day migrants (most of the insect-eaters) ride at their highest. The night travelers usually have no trouble avoiding obstacles. However, an unexpected meeting of cold and warm fronts in their path can produce appalling slaughter. As the colliding pressure areas spawn turbulence and low clouds, the

How Birds Find Their Way in the Sky
birds are forced down until they are below the tops of skyscrapers and the tallest television towers. Though their eyesight is normally wonderful, they become confused and blinded by the blaze of cities beneath the clouds.

Air tragedy. On such a night in September, 1948, thousands of birds crashed into New York's Empire State Building. Their bodies rained on neighboring roofs and streets for six hours. That same night, flocks smashed into a lofty Philadelphia building and fell to the sidewalk so thickly that people couldn't step there. A similar catastrophe was occurring in Baltimore.

Over wide stretches of water, on the other hand, flocks of little land birds have been seen flying at a height of only 200 feet. Sandpipers travel hundreds of miles barely clearing the waves.

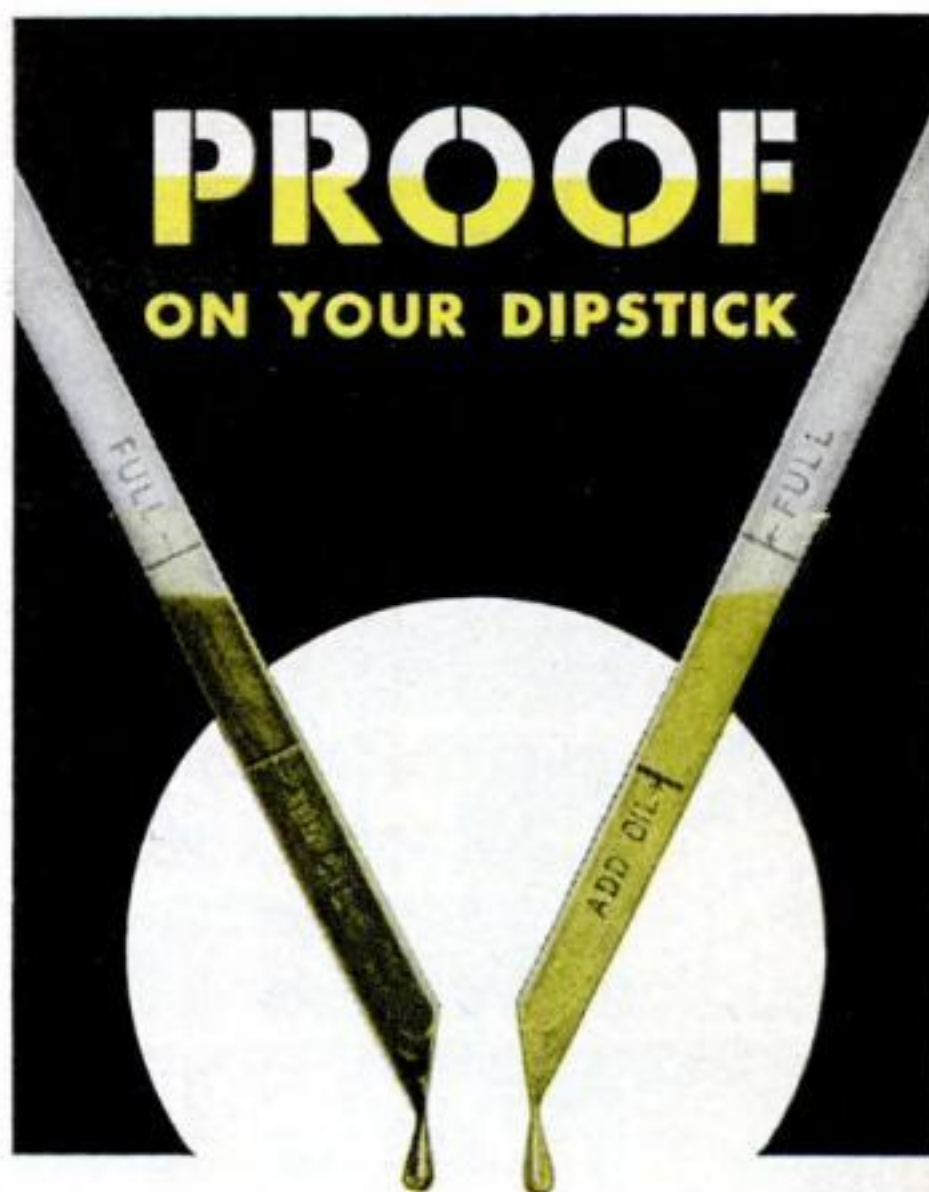
This man's-eye view of the bird world was clouded for thousands of years. Scholars often wondered where their feathered friends went in the fall, but the answers that occurred to them were odd indeed.

Aristotle said that birds hibernated in caves, hollow trees, and even under the mud of marshes. A giddier commentator, 20 centuries later, declared that they all spent their winters on the moon. Another writer couldn't guess where they disappeared to, but surely, he said, the big ones must carry the little ones on their backs.

And so it went, until banding records gradually made the fascinating picture clear. But even the old boys knew that wherever the birds spent their winters, they always came back in the spring.

The eternal return. As spring spreads northward from the equator, they all follow it, driven by the old biological urge to breed. Back they go over the same flyways, making the same stopovers, and, miraculously, often returning to exactly the same spot where they spent the previous summer. It's a sad commentary on marital fidelity among birds, though, that rarely do *both* mates come back to the scene of last year's liaison.

For the most part, the males arrive in the north first, find a place to raise a family, guard it stoutly, and sing their heads off—to make sure that the girls can't possibly fail to find them when they get there.



Hastings keeps oil clean

Oil shows dirty? Dirt is abrasive and dirty oil causes wear. Get full-time protection—ask for Hastings Oil Filter Cartridges, and have *clean oil* from filter change to filter change.*

The Hastings DENSITE filtering material traps and holds all the dirt, even the most microscopic size particles. And, *only* Hastings has Densite.

Hastings Cartridges assure clean oil—less engine wear and less subsequent repair bills—as no other filter can. See for yourself . . . on your dipstick!

*When replaced
as normally
recommended



U. S. Patent
Nos. 2797811, 2584711

HASTINGS
OIL FILTER CARTRIDGES

HASTINGS MANUFACTURING COMPANY
HASTINGS, MICHIGAN
Oil Filters, Piston Rings, Casite Additives,
Spark Plugs

Master LAMINATED Padlocks



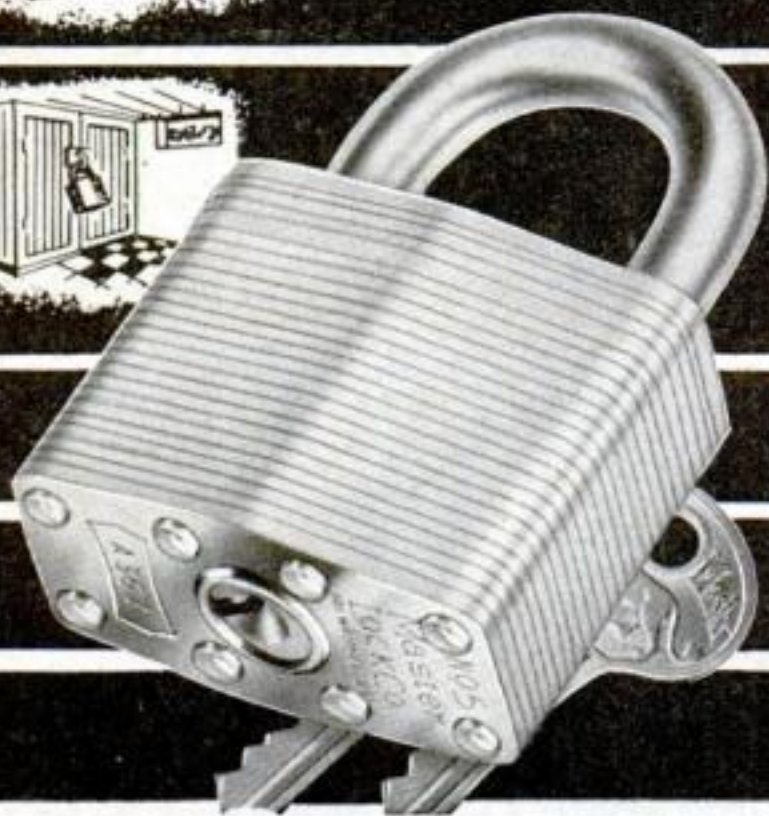
**protect
your**



**property
and**



valuables!



\$1.25 to \$4.00, in a variety of sizes, at
locksmiths and hardware stores everywhere

Master Lock Company.

MILWAUKEE 45, WISCONSIN
World's Largest Padlock Manufacturers

What Happens When You Black Out

[Continued from page 114]

or when there are fears that must be denied. For example, people frequently pass out in doctors' offices when facing some minor procedure. They're afraid—but also afraid to express their fear since it may lead to ridicule.

What happens? With fear and danger, the heart accelerates and the blood flow to the muscles increases—for the purpose of action. But there is no action. And just standing there motionless, without doing or even saying anything, leads to pooling of the blood in the lower part of the body. The result is a fall in blood pressure, and a lessening of blood reaching the brain.

What are other causes of blackouts?

There are dozens, some of them not well known:

- Blackouts often go with disease states such as strokes, epilepsy, poorly controlled diabetes. Barbiturate (sleeping pill) and other poisoning can produce them.

- Accidental contact with high-voltage electricity or even household voltages.

- Severe, prolonged coughing can produce a blackout by increasing pressure within the chest so much that blood flow there is retarded and less blood gets back to the heart. The heart then pumps out less, so the brain gets less.

- Overbreathing—which many people do under strain without being aware of it—brings in more oxygen but also gets rid of too much carbon dioxide. When the carbon-dioxide level in the blood falls far enough, brain centers are affected.

- Holding the breath, on the other hand, can produce unconsciousness by building up the level of carbon dioxide; in high concentration, it becomes an anesthetic. Recently, several cases where expert swimmers drowned during attempts at prolonged underwater swimming have been traced to breath-holding.

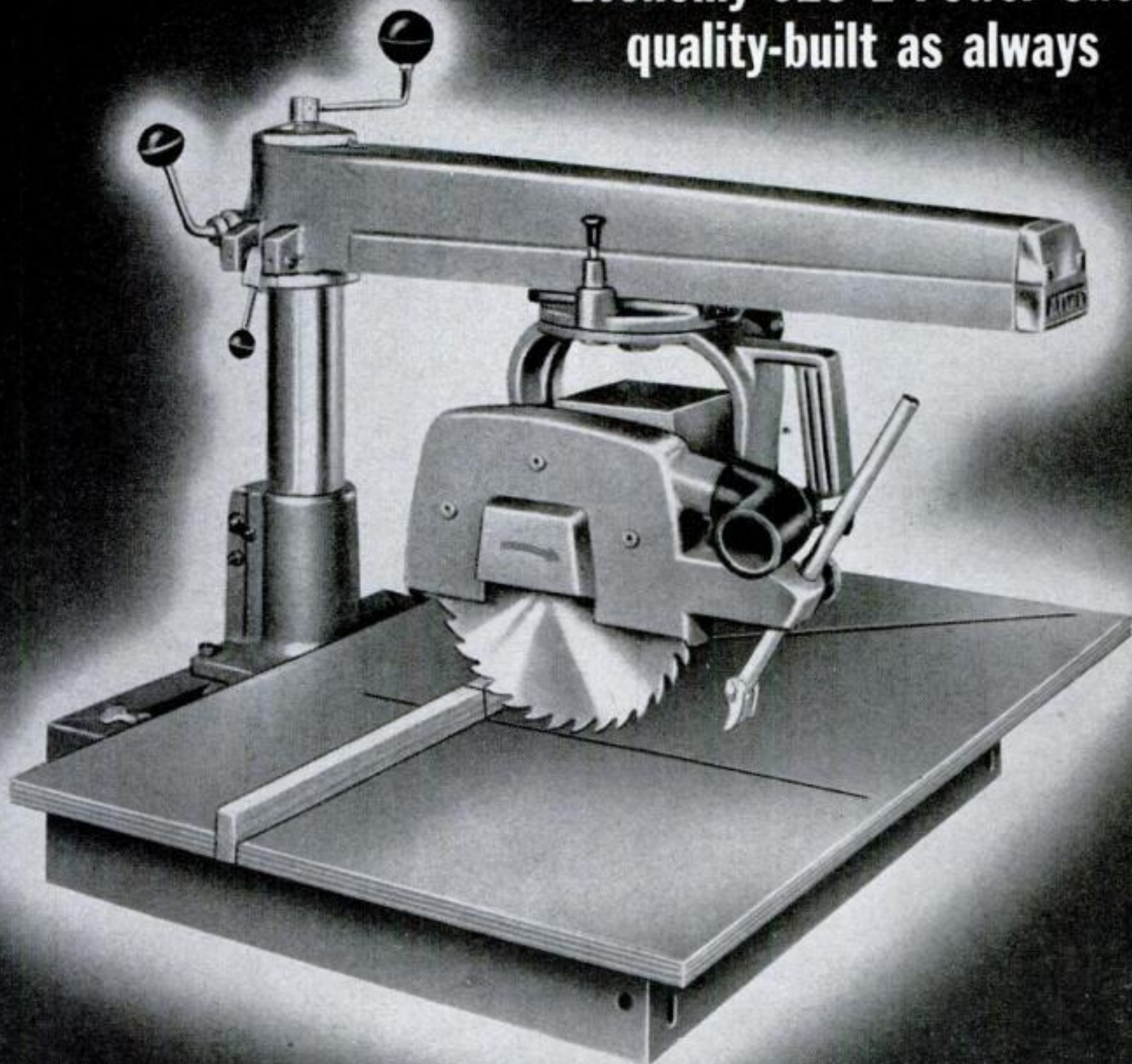
- Many mysterious bathroom blackouts have been traced to a combination of breath-holding and straining during elimination. This can change the heart rhythm so that less blood gets to the brain—sometimes enough less to produce unconsciousness.

- And lately, even TV watching has turned out to be a cause of blackouts.

CONTINUED

NEW DEWALT for only \$199!

Economy 925-E Power Shop,
quality-built as always



YOU SAVE \$50

This 925-E DEWALT gives you features not found in other makes costing 25% more. It's cut-tested for accuracy, power-packed, versatile, safe. See it at your dealer's now. Send coupon for free catalog.

DEWALT, INC., Dept. PS-610, Lancaster, Pa.
Please send me free, 20-page catalog on
DEWALT.

Name _____

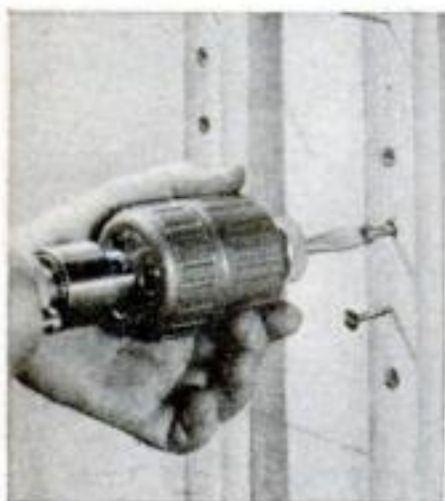
Address _____

City _____ State _____

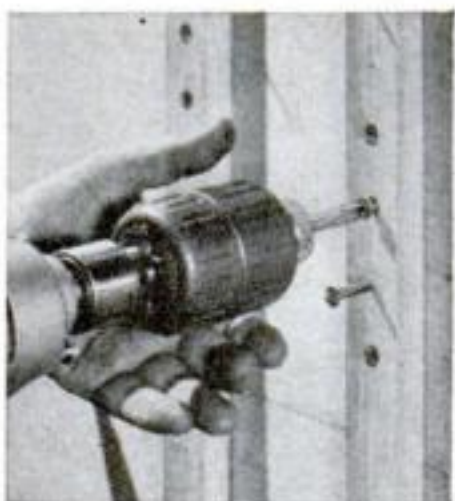
THE EASIEST WAY IN THE WORLD TO DRIVE AND REMOVE SCREWS



1. After drilling pilot holes simply attach a Versamatic to electric drill. Fits any make.

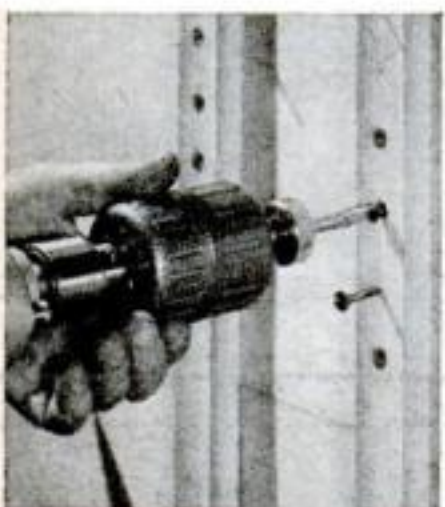


2. Place screw in hole; drive it easily with slight forward pressure . . . hold housing in fingertips.



3. Your fingers act as a clutch . . . starting, stopping action instantly. Simple and safe . . . no blisters.

Versamatic puts your power drill into low gear...



4. Versamatic runs in reverse for removing screws. You won't believe how easy it is until you try it.

by means of 7 to 1
speed reduction.
Gives your drill 7
times more power.

Supreme Versamatic

MADE BY THE MAKERS OF
SUPREME BRAND CHUCKS

SUPREME PRODUCTS
CORPORATION

2222 S. CALUMET, CHICAGO

Sold by leading tool dealers...\$14.95 list

PRECISION  PRODUCTS

What Happens When You Black Out
The flickering light produces a kind of epileptic attack in sensitive persons.

*How can you determine why
somebody has passed out?*

With so many possible causes, it's not always easy. Sometimes a quick search of the immediate surrounding area will disclose an electric-shock hazard, whisky bottle, or empty poison container. There may be evidence of injury, particularly about the head. If the pupils, the black center spots of the eyes, are unequal in size, there is a possibility of stroke or brain concussion. Blood-tinged saliva or frothy lips mean an epileptic fit.

Is the victim's face red, white, or blue? It's likely to be one shade or another.

White unconsciousness most often is due to simple fainting. Other possible factors include hemorrhage and shock.

In red unconsciousness, strokes and skull injuries are most common causes.

Blue unconsciousness indicates asphyxiation or near asphyxiation.

These are just rough guides. It may take a skilled physician to pin it down.

Can you prevent a blackout?

You can often avoid fainting if you know the warning signals—ringing in the ears, blurring of vision, paleness, beads of perspiration on the forehead, and a feeling of weakness. Lying down—or bending forward at the waist and putting the head between the knees—will get more blood to the brain.

*What can you do to help an
unconscious victim?*

Lay him down and loosen his collar.

If he's blue and breathing is absent, send for a doctor and start artificial respiration at once. And keep at it.

If he's red, raise his head slightly and get a call in for a doctor. Give no stimulants—give *nothing* by mouth while any victim is unconscious. Cover his body to keep him warm, and apply an ice bag, or cold, wet cloths, to his head.

If it's white unconsciousness, lay the victim down with the head slightly lower than the rest of the body if possible. A roll of clothing under the hips will help. Hold aromatic spirits of ammonia, if available, under his nose—but not if you see any signs of a skull injury.

Saves work in painting

Why "break your back" washing and sandpapering woodwork before you refinish it? There's a far easier way—WIL-BOND!

This unique liquid removes all greasy dirt. At the same time it dulls the old finish—no messy, dusty sandpapering needed.

The new finish spreads without streaking, and bonds tightly. Fine job! Less work!

At paint and hardware stores.

- Send 25c for illustrated Refinishing Manual or write for free Wil-Bond folder.

Wilson-Imperial Co., 121 Chestnut St., Newark 5, N.J.



FREE
THE HISTORY OF
THE COMPASS
SEND FOR YOUR COPY

New **DINSMORE**
Celebrity
COMPASSES

in Beautiful GOLD or SILVER

A jeweled, precision instrument—designed for modern cars. Full, indirect illumination. Sharp, clear letters. Silver or gold Celebrity models \$7.45, standard models \$5.95, illuminated \$6.95. APPROVED BY AUTO MAKERS. Fine Quality Compasses for over 31 Years.

DINSMORE INSTRUMENT CO.
1804 Kelso St., Flint 1, Mich.

Write
for Folder



GENUINE ALNICO MAGNETS

AMAZING, PERMANENT, NON-ELECTRIC. HIGHLY PRACTICAL. Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water; tools from tanks & drains. GUARANTEED. Try any magnet one week. Money back if you are not well-pleased.

- No. S-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block. \$18.00
- No. S-625 (Wt. 70 oz.) Has pull of 125 lbs. on steel block. \$10.00
- No. S-575 (Wt. 18 oz.) Has pull of 75 lbs. on steel block. \$7.00
- No. S-500 (Wt. 13 oz.) Has pull of 50 lbs. on steel block. \$5.00
- No. S-90 (Wt. 5 oz.) Has pull of 15 lbs. on steel block. \$3.50
- No. S-44 Rod Magnets for Electric Guitars 1/4" Dia. x 1 1/4". 12 for \$4.00
- No. S-47 Hot Pad Magnets. 10 for \$1.00. 50 for \$4.87
- No. S-35 Hobbyist assortment of 8 magnets. \$2.00

Send M.O. or check. We pay postage. Sorry no C.O.D.'s.
MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami 42, Fla.

SAVE HUNDREDS OF DOLLARS—DO YOUR
OWN CONCRETE CONSTRUCTION



- Mixes while transporting
- Dumps hydraulically
- Attaches in minutes
- Unconditional guarantee

For FREE folder, write:

UNIVERSAL PULLEYS CO., INC.
383 N. Mosley • Wichita, Kansas

Works
in
seconds!



Loosens Rusted Bolts
nuts, screws, "frozen" parts!

LIQUID WRENCH®

SUPER-PENETRANT

The super-penetrating rust solvent that quickly loosens rust and corrosion.

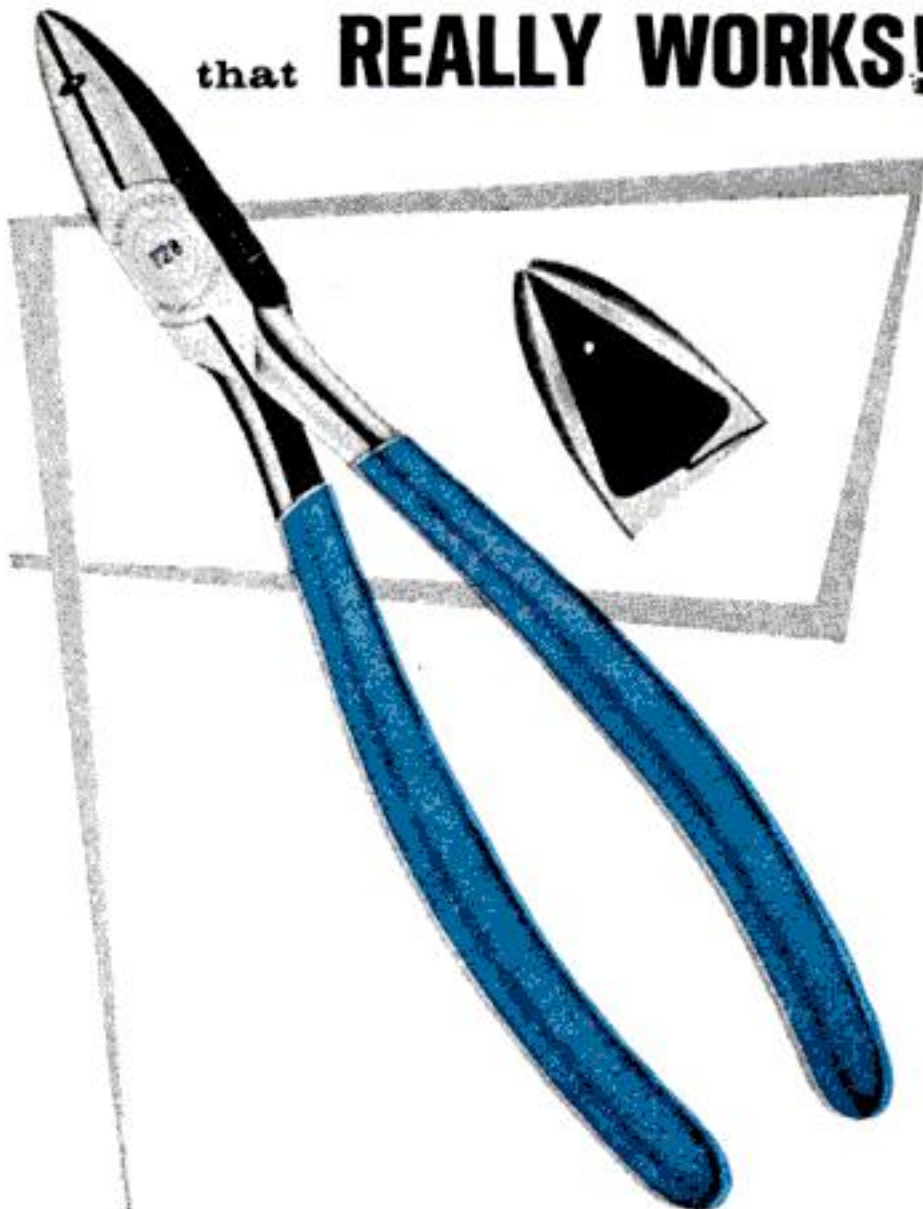
AT ALL HARDWARE
AND AUTO STORES

RADIATOR SPECIALTY COMPANY
CHARLOTTE, N. C.



a wire-stripping notch

that **REALLY WORKS!**



Specially Designed

CHANNEL LOCK®

No. 728 Long-reach

Diagonal Cutter

You'll strip off plastic insulation quick as a wink—clean and smooth—with the patented wire-stripping notch of this CHANNELLOCK Diagonal Cutter. And you'll like the handy long reach . . . the precision-matched, hand honed cutting edges, too; A versatile cutter for electrical, radio, TV, Hi-Fi and all other types of electronics work. Comfortable, blue-plastic grips. Top quality, polished forged steel. Ask your tool supplier for a CHANNELLOCK No. 728 Diagonal Cutter. If he's out of them, ask him to order one for you.



Write for Catalog of
Complete Line of Pliers

CHAMPION DEARMENT TOOL COMPANY
Meadville 2, Pennsylvania

AIR COMPRESSORS BY JOHNSON!

38 ← QUALITY MODELS FROM 1/3 TO 3/4 HP FOR
INDUSTRY, SHOP, GARAGE, FARM, HOME, HOBBIES

Now you can select a quality-built air compressor from the line that outperforms them all! There's a Johnson compressor for every purpose. What's more, Johnson, with 75 years of experience in building precision pneumatic equipment, knows how to combine really high quality with realistically low price!

Johnson compressors feature capacitor-type, ball-bearing motors, automatic controls, motor overload protection, patented safety system.

Send in the coupon below for your copy of the new Johnson catalog. Select the model best suited to your needs — air seal or piston type; electric, gasoline, or PTO power source. Catalog also shows complete line of accessories including spray guns, paint tanks, hoses, gauges.



THE "200" SERIES — Sturdy, 1/3 HP piston-type compressors easily handle any job requiring up to 90 pounds pressure, up to 1.0 cfm of air volume. Units are available with or without storage tank.



THE "400" SERIES — Heavy duty piston compressors for jobs up to 125 pounds pressure, up to 2.8 cfm air volume. Available with horizontal or vertical tank. Can also be purchased without air storage tank.



JOHNSON SERVICE COMPANY

Compressor Division, Dept. CC
Milwaukee 1, Wisconsin

I'd like a copy of the new Johnson Air Compressor catalog and the name of nearest supplier.

Name.....

Address.....

City.....Zone.....State.....

C-144

Tokyo to Carolina in 12½ Hours

[Continued from page 130]

(Joe Blaylock left the pilot's seat for only brief moments.)

First landfall. Following a Great Circle route, we struck out across the North Pacific, passing quite close to the Russian-held Kuril Islands. We crossed the international date line, and about 20 minutes later (and 2,000 miles out) made our first landfall: a little group of blobs in a gray arctic sea. These were the Rat Islands, part of the Aleutian chain.

Trask's pessimistic prediction earlier about tail winds seemed destined to be true. There was no wind at all, on the tail or elsewhere. The ground-speed needle stayed on 500 knots, hour after hour. Capt. Blaylock was using his "Mach-hold button," which caused the airplane to climb automatically from our original 33,000 feet as it burned its fuel load.

"I can't use this button when I'm flying an assigned altitude under FAA control," Blaylock said. "But out here there's really not much danger of a mid-air collision so we can slide uphill. The button holds our speed constant—and as we burn light we gain altitude. We're hoping, of course, to get up in a nice fat jet-stream. We're at 38,000 right now."

The flight was enlivened from time to time by the "dump valve" releasing overpressure from the cabin. It was an explosive *pshhchewww!* sound that brought me straight up each time I heard it until McKissack explained it was harmless.

"Better than the fuselage busting out like an inner tube, hey?" he said.

Nature's freezer. Each of us had three flight lunches and the cabin was soon a shambles of picked-over sandwiches, eggshells, and empty milk cartons. McKissack showed me how to cool the tomato juice. You stick it in the crack of one of the emergency escape hatches next to the skin of the plane (the air outside is minus 65 degrees F. and rushing past at 500 knots, which gives it a chill factor of about a zillion). There's only one drawback to McKissack's method: If you leave the juice there too long you bring back a rock-hard cylinder of tomato ice.

The sun swung around, low to the south at all times, and finally sank into the sea. A period of afterglow set in. I was sitting in the jump seat at the time, and presently felt a nudge and twisted

ARROW'S T-50 All-Purpose Heavy Duty STAPLE GUN

Grip the gun that gets the job done *faster, easier and better!* It's a breeze! One *squeeze* and it's nailed — with Arrow's *one-hand operated* T-50 Automatic Staple Gun! And you always have other hand *free* to position work or balance self! This rugged, all-steel, jam-proof professional tool is built for a long life of smooth, trouble-free operation!

Uses 6 staple sizes:
1/4", 5/16", 3/8", 1/2", 9/16"
and ARROW'S CEILTILE STAPLE
Especially Designed for Ceiling Tile



Shoots A Staple Wherever You'd Drive a Nail



CEILING TILE

INSULATING

UPHOLSTERING

SCREENING

WIRE FENCING

Pioneers and Pacesetters
For Over a
Quarter Century

ARROW FASTENER COMPANY, INC.

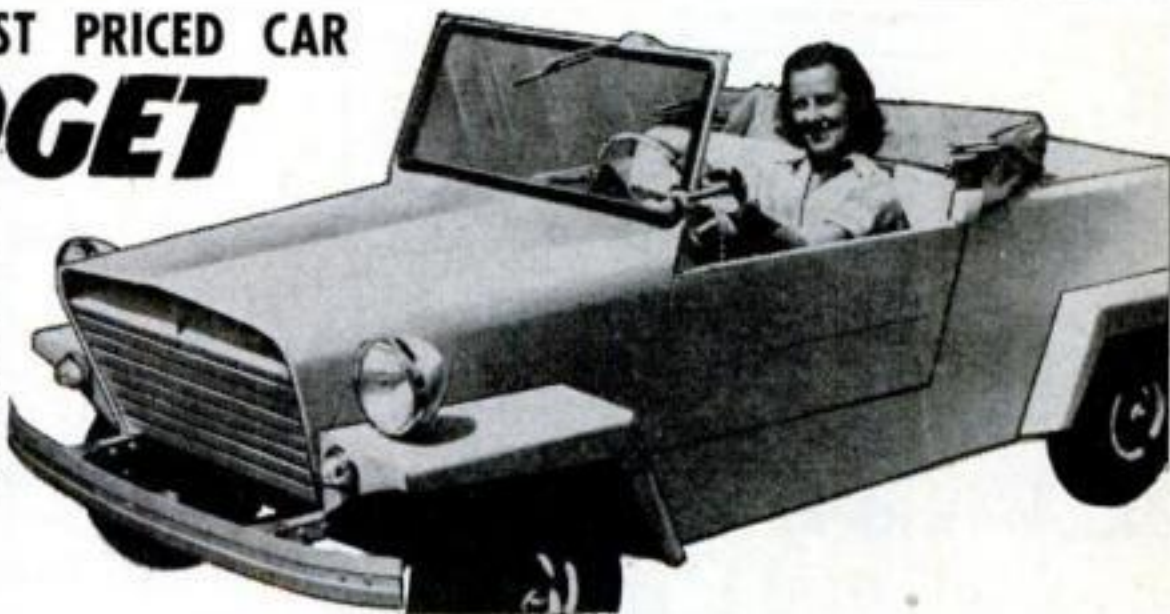
One Junius Street • Brooklyn 12, N. Y.

AVAILABLE
at your local
Hardware, Lumber,
Building Supply or
Stationery Dealer.

WORLD'S MOST EXCITING LOWEST PRICED CAR *New* **KING MIDGET**

15 years continuous production—Thousands of proud, satisfied owners from Alaska to Ecuador. Many report 50 to 75 miles per gallon. Rear mounted air-cooled engine, smooth fully automatic transmission, four wheel hydraulic brakes. A safe and amazing small car you can own and drive at a fraction of the cost of any other. You owe it to yourself to get the surprising facts and prices. Buy it at the dealer price if no dealer near you. Rider Agents wanted. Send 25c for 32 page book, full details, dealers price, or \$1 (refunded first order) for this plus Service and Repair Manual and 16 5x7 photos of car and factory.

MIDGET MOTORS CORPORATION
ATHENS 2, OHIO



NEW! "LIFE GUARD" BLADE

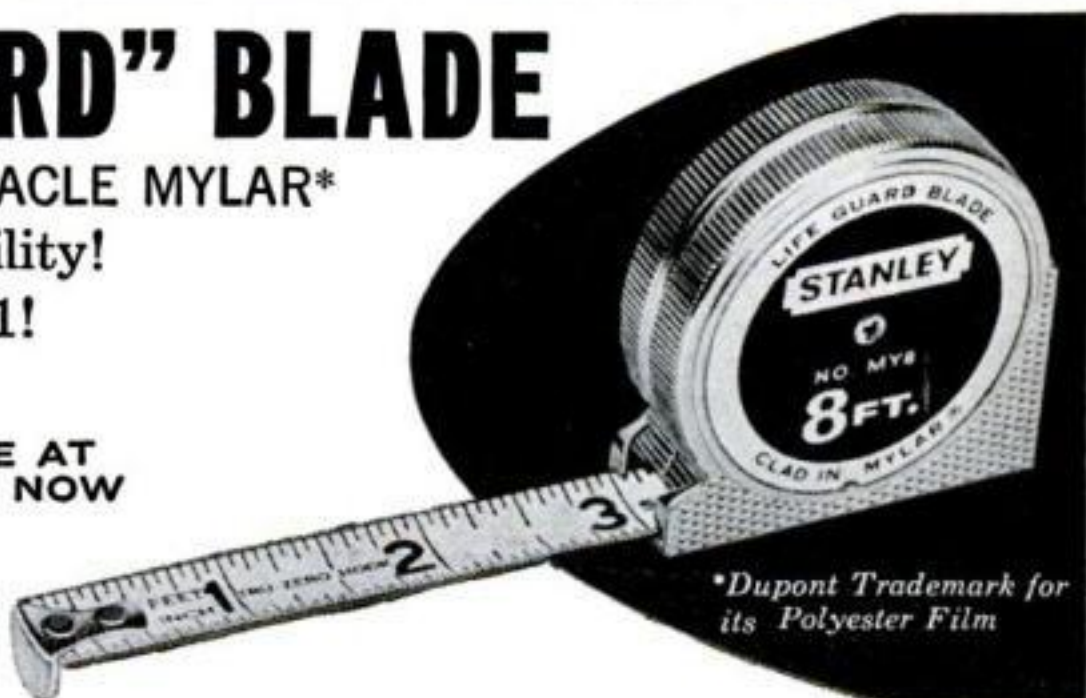
CLAD IN MIRACLE MYLAR*

- Yellow for maximum visibility!
- Outlasts other blades 3 to 1!
- Acid-proof, abrasive-proof!

SEE THIS NEW TAPE RULE AT
YOUR HARDWARE STORE NOW

STANLEY®

THE TOOL BOX OF THE WORLD



*Dupont Trademark for
its Polyester Film

RIDE..and Watch LEAVES VANISH!



Prepare your home grounds to be attractive all winter long! Gravely Power Equipment does the leaf mulching, fall plowing, mowing, and clean-up work, fast.

POWERFUL-6.6 HP. VERSATILE-choose from 30 year round tools. All-gear drive, power reverse, plus optional starter. Built for tough jobs!

Ride while your Tractor does the work.

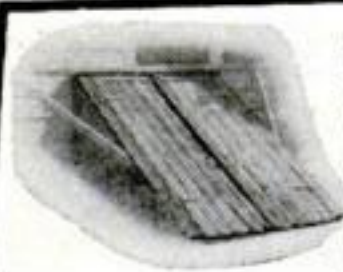


FREE BOOKLET -- 24 page
POWER Vs. DRUDGERY
tells all. Write Now!

GRAVELY TRACTORS

P.O. BOX 602-K DUNBAR, W. VA.

PERFORMANCE-PROVED SINCE 1922



REPLACE YOUR WORN-OUT WOODEN HATCHWAY...

with an
all-steel
BILCO
basement
door



... and your basement entrance will be weathertight, good-looking — for a lifetime. A spring-balanced Bilco door floats open at a touch ... locks securely ... costs so little. And you can install it yourself — in just a few hours!

Bilco

AMERICA'S FINEST
BASEMENT DOOR

The Bilco Co., Dept. R-1010
New Haven 5, Conn

Please send me your free illustrated folder
and name of local dealer.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Tokyo to Carolina in 12½ Hours

around to find John Trask. He pointed.

Ward and his boys were staring at the ground-speed indicator. It had come unstuck. It now stood at 510 knots.

"Jetstream?" I asked Ward.

"Can't tell yet."

I watched awhile, and the needle gradually eased up to 520 knots, and I lost interest and peered over Joe Blaylock's shoulders through the windscreen. It was a spectacular sight. Stars were beginning to burn in the apricot flush of the after-glow. The cloud-deck, 30,000 feet below, stretched off to the rim of the world, white as cotton. The night was coming on from the north, a great steel-blue shadow dropping down from the pole. The big jet seemed to boat along over the cotton sea, gently, almost softly, the noise of the jets far removed, the relative motion sedate and leisurely at this giant altitude.

Behind me, somebody said excitedly, "580 knots! It's a jetstream, all right..."

To Seattle like a bullet. The plane was now beginning to wallow and buck as the ferocious wind tunnel in the sky into which we'd stumbled whipped over our skin. Everybody was awake, rooting for the jetstream. And their hopes were rewarded. We finally stabilized at a ground speed of 740 m.p.h., which brought us in on Seattle like a silver bullet. Seattle defense radar challenged us about this time.

"Departed Yokota Air Force Base, Japan," Lynn Dyes said from the copilot's seat. "Destination Seymour-Johnson Air Force Base, North Carolina."

There was a startled pause below. Then the voice said, in a somewhat awed tone, "You people wouldn't be trying for a speed record, would you?"

"Yes," said Dyes. "We would."

"You keep on like you're going," defense radar said, "and you sure ought to make it. We're painting you at 738 miles an hour right now."

But almost as quickly as it had risen, our speed dropped as we left the jetstream over the continental U. S. The excitement died. Saucy Sixty's bushed passengers curled up like pretzels and tried to get comfortable among the piles of luggage, spare tires for the KC-135, and other gear lashed in the middle of the cabin. I squeezed into the jump seat behind Blaylock and waited for the

Tokyo to Carolina in 12½ Hours

dawn. It came up on the left like a pale-blue spotlight in a black-velvet sky pricked with stars. The blue color changed to dirty white. The stars faded. Then the sun edged over the rim of the clouds, and for a moment or so the entire sky to our right was shrouded in delicate orchid reflections. Only for a moment. Then we were staring into the eye-splintering glare of the naked sun.

Victory fly-by. We called Lewiston, Mont., for Seymour-Johnson weather. No problem, we were told. We bored diagonally across the face of America—Iowa, Illinois, Ohio—and when we looked down through a hole in the clouds and saw Cincinnati, Joe Blaylock started a very gradual let-down for a landing. He knew we were going to break the unrefueled speed record for a flight of this length and he had asked for (and received) permission to do a victory fly-by over the small crowd of friends and wives who would be waiting on the field.

That fly-by was very nice. I was standing up in the navigation compartment (just behind Blaylock) and saw him push the nose down and heard the engines hoot to full military power as the big jet tanker tore low over the waving welcomers, turned steeply and smartly on the base-leg of the landing pattern, and settled for a perfect grease-job (Blaylock Specials, the crew calls them).

A few moments later we were standing on the concrete, stretching and blinking. Mrs. Blaylock and Joe's kids were just a few steps away. I'm not sure whether Joe kissed his wife first or picked up his boy first. Maybe he did both at the same time. Behind me I heard somebody say excitedly, "Twelve hours and 32 minutes over the field. That's 573 miles an hour for the full trip."

I looked around. One of the GI passengers was standing there. "How long was the full trip?" I asked.

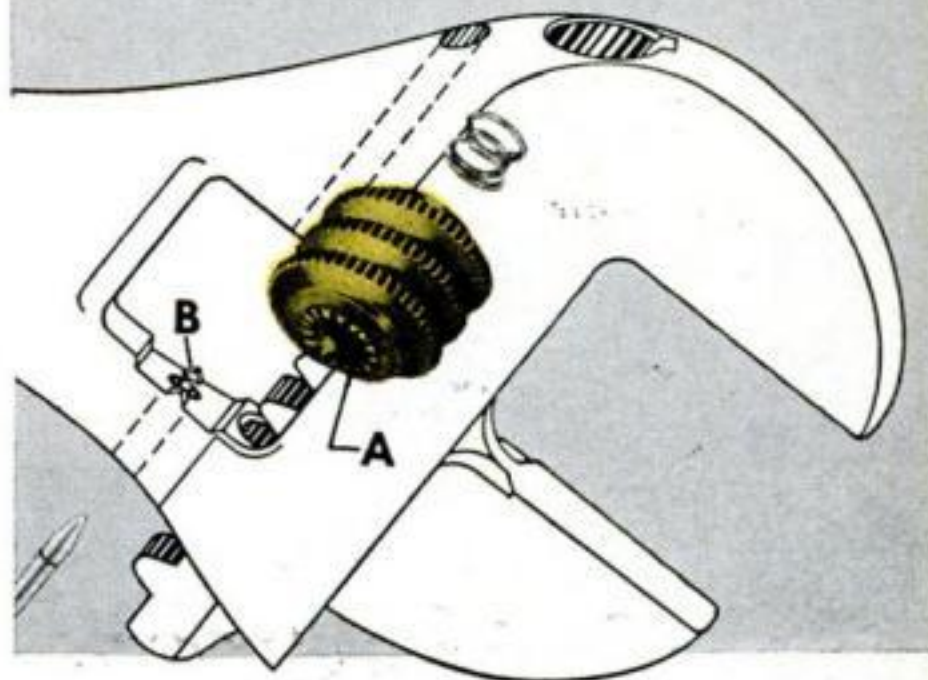
"Just 7,175 miles. We beat LeMay's time from Tokyo to Washington by a nice margin." The GI grinned. "As a matter of fact, we got here an hour and a half before we took off."

He was right. We had left Yokota at 0930 Tokyo time, June 15, 1960—and we had arrived at Seymour-Johnson Air Force Base at 0806 Eastern Standard Time, June 15, 1960.

New Proto locking feature



Grooves (A) in spring-loaded knurl mesh with teeth (B) in wrench body to hold exact jaw openings. Pressure on lower jaw, when in use, pulls down on knurl, automatically locking teeth still tighter.



ADJUSTABLE WRENCHES
PAT. PEND.

No knuckle busting here! With Clik-Stop's automatic locking, you do more work in less time...and your hands are much safer.

No need to reset every time you go back to same size fittings. Jaws won't "creep." No levers or gadgets to set. Proto's Clik-Stop is the only locking adjustable available in all sizes, 4" through 20". The locking feature is automatic. Buy Clik-Stops from your Proto supplier. (See the Yellow Pages.)

Available in ALL sizes

704L	706L	708L	710L	712L	715L	716L	720L
4"	6"	8"	10"	12"	15"	16"	20"

Meets Federal
Specifications:
GGG-W-631A,
Type 1



DIVISION OF PENDLETON TOOL INDUSTRIES, INC.

2203 Santa Fe Avenue, Los Angeles 54, Calif.

"I put it together with
my Wen Solder Gun"



Buster Weston

The Wen 100K Solder Gun Kit consists of a feather-light slim gun with 100 watts power. It heats in 2½ seconds. A built-in spotlight focuses on the work. In addition you get extra tips for hot cutting and smoothing as well as a supply of rosin core solder ... all in a strong metal box for neat compact storage. It's perfect for every home soldering job. Only...

\$7.95

YOU CAN ALWAYS DEPEND ON
NEWER AND FINER PRODUCTS FROM

WEN

FINE FINISH SANDER—Light, handy and quiet. Powerful motor delivers 14,400 straight-line-action strokes per minute. Perfect for fine finishing and polishing. Strong black plastic case. Comes complete with 6 assorted abrasive sheets and 2 polishing pads. **\$13.95**



MULTI-PURPOSE ½ HP "ALL-SAW"—Makes "one-job" saws obsolete. Does everything a Pattern Saw will do ... more than a circular saw ... many things normally done by a hand saw or nibbler—and many things that, until now, only a chain saw could do. UL "Industrially Rated," it cuts anything from a 6" log to intricate patterns in wood, metal, etc. Complete with 7 blades. **\$44.95**



¾" 2-Speed Power Drill.....**\$29.95**
Lightweight Sabre Saw.....**\$26.95**

WEN PRODUCTS, INC., 5810 Northwest Hwy., Chicago 31, Ill.

Answers to PS Puzzlers on 28 and 30

Equator. Amazing as it seems, the string will stand almost six inches away from the equator throughout the whole circumference. Here's why: Changing miles to yards, the 25,000-mile circumference works out to 44,000,000 yards. Divide that by π (22/7) and you get 14,000,000 yards for the earth's diameter, or 7,000,000 yards for the radius. But our error ups the circumference to 44,000,001 yards. Divide this by π and the diameter becomes 14,000,000 yards and 11 5/11 inches—or a radius of 7,000,000 yards and almost 6 inches!

The suitors. All three have marks. Here's why: Suppose only one, A, has a mark. Then B and C would both raise their hands and A would not. Then A, who can see that B and C are without marks, would automatically know he must have one, and quickly announce this fact to the king.

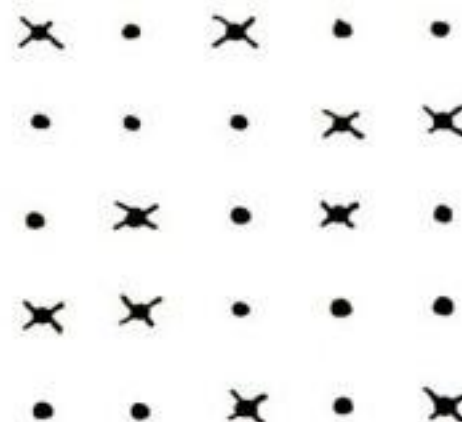
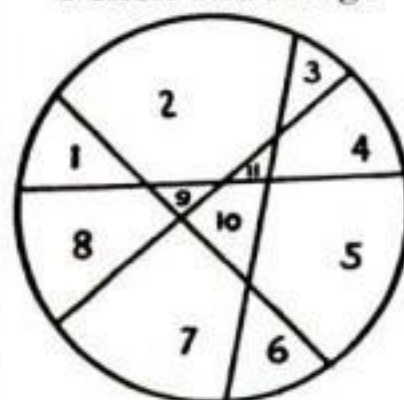
Now suppose two out of three have marks, say A and B. All three would have their hands raised. From A's point of view B has a mark, C doesn't. Yet B has his hand raised. That can only mean that he, A, must have a mark, and he too would quickly call out to the king. (B could reason the same way, obviously.)

However no one makes this quick deduction: we are told there is *much* cogitation. The only possibility then is that all three have marks, and the first man who perceives this does indeed deserve the princess's hand.

Ping-pong. Jim held the ball down in a saucepan of hot water. The water pressure being negligible, the heat of the water caused the air inside the ball to expand and push the dent out.

Chess. No matter how you put a domino down to cover two squares, one of the squares will be red, one black. But the diagonal corners that have been removed are both red. That leaves two more black squares than red ones left. After 30 dominoes have been put down on the board there will still be two black squares left which can't be covered by the one remaining domino.

Pencil doodling.



11 pieces.

850-Mile Drive in a Buick Special

[Continued from page 91]

rating Michigan's upper and lower peninsulas, we went to a drive-in movie. I switched on the headlights. No dice.

"Hmm," said Wurtz, down in his throat. He sat there beside me for a long minute, thinking. Then he got that huge bulk of his down on one shoulder under the left side of the panel. In a minute the headlights blazed on.

"Bad connection at the dimmer switch."

The next day we headed home, leaving much of Michigan with a Wurtz-created food famine. We got a late start on our

234 miles to Flint, and I had a mid-afternoon airplane to catch.

"Let's roll it," said Wurtz.

At least half our route was wild, deer country. We rolled it, gluing the speedometer needle to a legal 65 miles an hour. We refueled at 1,241.7 miles. We had gotten 22.6 m.p.g. for 219.2 miles.

But now we hit headwinds. The gusts were so hard at times that they shook us. On our final refueling, at 1,446.6 miles, we sponged up 10.9 gallons for 18.8 m.p.g. Our overall average: 20.3 m.p.g.



**The proof is in
the puffing**

**and P. A. has the flavor
most favored in the U.S.A.**

**PORTER WAGONER
OF "GRAND OLE OPRY"**

- always tastes fresh
- mild, mellow flavor
- cool 'n' steady burning



R. J. Reynolds
Tobacco Co.,
Winston-Salem,
N. C.

PRINCE ALBERT

America's Largest-Selling Smoking Tobacco!

WIREFORMER Works Wonders with Wire

It Bends—It Cuts—It Straightens



Any wire, any size up to 5/32" dia. in any metal—mild steel, copper, aluminum, etc. (piano wire up to 1/8"). This includes coathangers, coiled or straight wire, including 5/32" cold rolled rod.

Cuts cleanly and neatly, any wire except spring steel or piano wire. Wireformer will also straighten wire. With these combined features in one tool, you can make your own peg board hooks, all types of hangers, clamps, handles, braces, chains, racks, shelf and equipment brackets, mobiles, letters, numerals, or any shape you want.

A simple, precision made, vise held tool of innumerable uses. Forms an eye of 3/16" inside diameter (just right for any nail, screw, or bolt up to that size). No pliers needed. Wireformer does the work with the pressure of one finger. Straightens the wire if you make a mistake. Cuts the wire just where you want it. Fits in your pocket. Case hardened, plated, with a plastic handle. Forms any angle, arc, or circle. Bends both right and left. Opens a whole new field of endeavor for anyone who makes or fixes things. Wireformer is a tool a woman or a child can use, and it's safe. You need a vise, but the dime-store variety will do. You have never seen anything like it before. We guarantee you'll love it, or your money back. Very complete instructions for precision forming, (fully illustrated), special adapter for small size wire, and brochure showing many things you can make included. Wireformer is the most useful tool you can buy for your home, shop, cottage, farm, factory, garage, studio, or workshop. As a gift, it's sure to please. Three dollar bills will get you one. Otherwise send check or money order for just..... **\$2.98**

We pay postage in U.S.A. Foreign countries \$3.50 via 1st class mail.

**ORDER WIRE DIRECT FROM LARGE STOCK
IMMEDIATE DELIVERY**

9 ga. (.148" dia.) galvanized steel wire, 24 pieces each 24" long. \$1.95 ppd.

5/32" dia. (.156") hardened aluminum wire. Bright finish. 20 pcs. 24" long. \$2.25 postpaid. Sorry, no wire to foreign countries.

SPECIAL ONE-TIME OFFER (save 43c)

1 Wireformer	\$2.98	\$6.75
1 package galvanized steel wire	1.95	
1 package aluminum wire	2.25	
	\$7.18	all for

Same with 2 Wireformers \$9.50 (save 66c)

limited time only

VINKEMULDER MFG. CO.

911 Princeton S.E., Grand Rapids 6, Michigan

It's Sharp... keep it that way with the right sharpening stone by

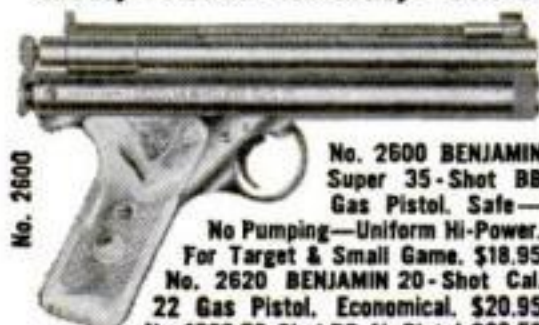


CARBORUNDUM®

KEEP YOUR... **BENJAMIN**

Largest Selection in the World—Single Shot & Repeaters for Every Shooter's Needs! • 25 MODELS

You Can **DEPEND** on **BENJAMIN**... for Safety—Power—Accuracy—Convenience—Economy



No. 2600 BENJAMIN Super 35-Shot BB Gas Pistol. Safe—No Pumping—Uniform Hi-Power. For Target & Small Game. \$18.95

No. 2620 BENJAMIN 20-Shot Cal. 22 Gas Pistol. Economical. \$20.95

No. 1300 50-Shot BB Air Pistol \$23.50

No. 1320 BENJAMIN 35-Shot Cal. 22 Air Pistol \$25.50

**HI-COMP
AIR GUNS
AND
POWERFUL
CO2 GUNS**

No. 3600 \$19.95

No. 3600 BENJAMIN Super 100 Shot BB Gas Rifle. Non-Toxic—Safe—Convenient—Uniform Hi-Velocity Power.

No. 3620 BENJAMIN Super 85 Shot Cal. 22 Gas Rifle. \$21.95

No. 3100 Super 100 Shot BB Air Rifle. Adj. Shooting Force \$24.95

No. 3120 BENJAMIN Super 85 Shot Cal. 22 Air Rifle. \$26.95



FREE Catalog All Models Benjamin Single Shot & Repeaters—Cal. BB or 177 or 22. Also, Special Hunting & Fishing Knife Offer.

BENJAMIN AIR RIFLE CO., 852 MARION ST., ST. LOUIS 4, MO.

How Those Political Polls Work

[Continued from page 135]

vote, when tallying the results of the survey.

How can the poll takers tell in advance who will vote and who won't? Read tea leaves?

It's not as bad as all that. However, the laws of mathematics have to be replaced by the much less certain science of psychology.

The surveys ask questions that rate each person's intention to vote. For example:

Which of these statements best expresses your feelings?

1. I definitely will not vote.
2. I don't plan to vote, but I might.
3. I'm not sure whether I'll vote or not.
4. I expect to vote, but I might not.
5. I am certain to vote (barring some accident).

Which of these statements do you agree with most?

1. It won't matter who is elected.
2. The differences between the candidates could affect the future of the country.
3. This is one of the most important elections ever held.

Any person who answers the first question with No. 5 and the second with No. 3 is a sure bet to vote. His preference would be counted. Anybody who replies to both questions with No. 1 is unlikely to vote. His preference could safely be thrown out.

Most people fall between these extremes. So each answer to several questions is assigned a numerical weight. The total score for each individual determines whether he will be counted as a voter or excluded as a nonvoter. The survey directors decide which score means what. This involves judgment, skill, experience—but not much mathematical science.

Okay, the nonvoters are winnowed out. But how do the pollsters know the others have answered truthfully? Don't people lie sometimes?

People give false answers when they don't like to admit the truth to them-

How Those Political Polls Work

selves. Many surveys produce inflated statistics on education—more people say they went to college, or graduated from high school, than could have done so. (There are other records that can be checked.) And surveys conducted immediately after an election turn up 80 percent “yes” answers to the question “Did you vote?” (The actual turnout never reaches 70 percent).

Face-saving falsehoods could mislead an election survey, as they apparently did once in California. At issue was a very expensive plan for old-age pensions. The survey found only 25 percent in favor, but in the election 45 percent voted for the plan. Evidently many people could not admit, even in confidence, that they might approve “heavy government spending.” (Some critics blame such discrepancies on sloppy sampling technique rather than untruthful answers.)

When self-esteem is not threatened, nearly everyone gives frank information on the most private matters. Those who are unwilling usually take refuge in evasion: “I don’t know,” or “I haven’t decided.”

That still leaves the surveys shaky. If many people lie, or are undecided, wouldn't the whole thing come out wrong?

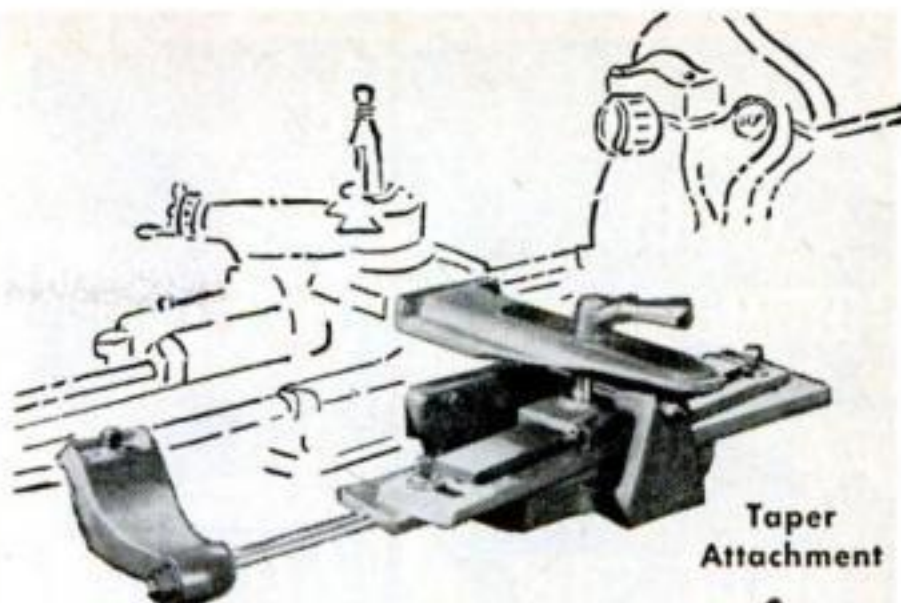
The pollsters make up the undecideds' minds for them, and predict which way they will vote.

There they go, reading tea leaves again! If a man says he himself doesn't know which way he will vote, how can the pollsters know?

Same way they predict whether or not he will cast a vote. A series of graded questions probes for concealed opinions. Typically, a man might be asked to rate the performance of the outgoing administration (excellent, good, average, fair, poor) and then to list famous men in the order of their ability. If he rated the administration excellent and listed its leaders first, it wouldn't be hard to forecast his vote.

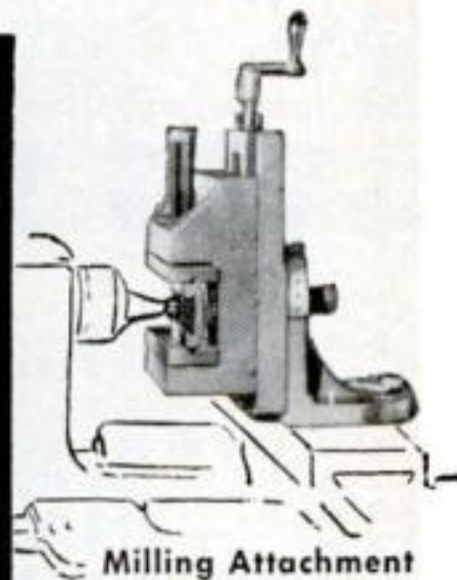
The same graded questions are a backstop for catching false answers. If many people claimed to prefer Candidate A,

CONTINUED



Taper Attachment

Get
More Work
out of
Your Lathe



Milling Attachment



Steady Rest



External Grinder



Live Centers



Handlever Collet Attachment

Use South Bend Attachments to...

Cut Machining Time • Simplify Difficult Jobs
Speed up Tooling • Handle More Types
of Jobs • Perform Non-lathe Operations

Write for complete information
on the largest selection of lathe attachments,
tools and accessories made.

SOUTH BEND LATHE

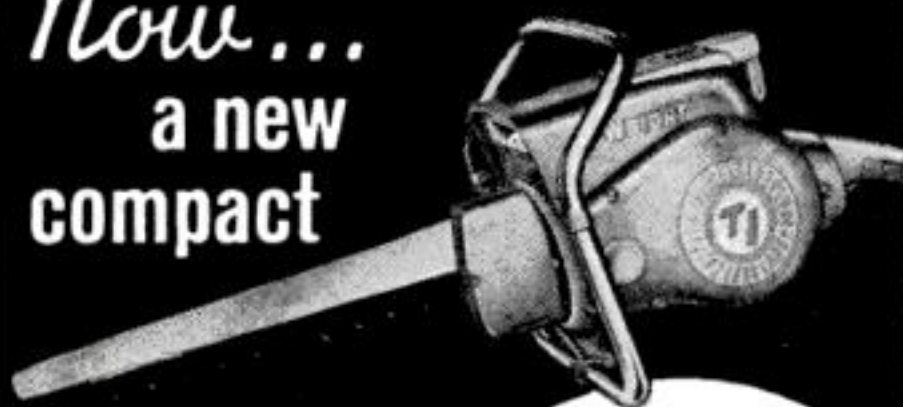
South Bend Lathe, Inc., South Bend 22, Indiana

Builders of Lathes, Milling Machines,
Shapers, Drill Presses, Pedestal Grinders

Up to 36 months to pay



Now...
a new
compact



power saw

Always safe,
because there's no
dangerous chain

WRIGHT
makes it ~~fun~~
to get things
DONE
safely

New kind of gasoline power saw for those 1001 cutting jobs. For limbing, trimming, clearing... cuts timber, firewood, fenceposts "like butter." Cuts with bottom edge only—there's no hazard from a dangerous, whipping, kicking chain. Cuts trees up to 20" wide. Powered by the most trouble-free power saw engine ever built. And... in two versatile models... #2016, COMPACT, LIGHT WEIGHT, 16" Blade... And #5020A, HEAVY-DUTY, 20" Blade. Priced from only \$139.50.

WRITE for FREE BOOKLET
and name of your nearby dealer



THOMAS INDUSTRIES INC.

Wright Saw Division

207 E. Broadway, Louisville 2, Ky., Dept. WPS-10



This is one
of Southern
Screw's
popular EZ to
C color-coded
labels. It's
your assurance
of unexcelled
quality!



For
**QUALITY RESULTS IN
EVERY PROJECT**

there is no substitute for
Slotted or Phillips

Southern Screws

Made in USA with USA materials by
Southern—leading fastener specialists

Buy 'em by the box and SAVE!

Sold Through Leading Hardware and
Building Supply Dealers

- Wood Screws
- Stove Bolts
- Tapping Screws
- Machine Screws
- Machine Nuts
- Carriage Bolts
- Drive Screws



ONLY A SCREW HOLDS LIKE A SCREW
Specify Southern... Most Craftsmen Do!

How Those Political Polls Work

yet considered Candidate B's friends and policies the best, a fishy aroma would seep out of the IBM machines.

Any other ways surveys can go wrong?

Yes. Surveys are not elections and their results must be interpreted cautiously, remembering that:

1. The inescapable margin of error makes close decisions dangerous. One survey last summer had Kennedy with 52 percent "leading" Nixon with 48 percent. That's stretching things. If you allow plus or minus four percent for possible error, which is optimistic, you get somewhere between 48 and 56 percent for Kennedy, somewhere between 44 and 52 percent for Nixon. The true figure for the whole country could fairly easily have come out 52-48 with Nixon ahead. From that survey you couldn't safely conclude anything except that the race was close.

2. Surveys forecast the popular vote, but presidents are chosen by the Electoral College. It is possible for a candidate to win the majority of the popular vote and still lose the election. That has happened twice (1876 and 1888).

3. Surveys gauge public opinion before an election. People can change their minds in the last few days. To catch last-minute switches, Gallup and Roper now run final surveys ending the Saturday before election day.

With so much human judgment involved, and so many chances for error, why should anyone believe the surveys at all?

Because they're skillfully and honestly conducted on sound principles—and they have a fair record for accuracy. The Gallup Poll has only once been as much as 6.8 percent off in predicting the vote in the past 11 national elections. It picked the wrong man to win once (1948, with 4.8 percent error in the vote).

Dr. Gallup says that he knows only two things for certain about election polls. One is that they are bound to pick the wrong side some time in the future. The other is that they are better guides to elections than any other method now available.

EMERSON ELECTRIC

NEW POWER For Your Tools...

There's an Emerson Electric Motor for every tool... sanders, saws, joiners, pumps, lathes, drills, buffers, etc... Home workshop or commercial. Operate in any position... exclusive dust-proof contact points. One year guarantee.

**multi
duti
MOTORS**

Write today for prices and FREE MOTOR SELECTOR GUIDE
...tells you the exact motors you need for your tools.

EMERSON ELECTRIC of St. Louis
8100 Florissant • St. Louis 36, Mo.

THE ORIGINAL PACKAGED BOAT KITS

• World's Largest Line—New Fiberglass Hulls. Over 200 styles Boats-Kits, Formed-Hulls, Semi & Custom finished. All types: Prams, Cruisers, Racers, Inboards, Outboards. Easy to build. Professional results. Dealers - Agents Inquire.
Send 15¢ for 3-Colored Catalogs 52 pg. Kit Catalog plus 20 pg. Hardware and 8 pg. Armor Glass books.
(SPECIAL OFFER!)
All 3-colored CATALOGS plus "Boating Handbook"... all for \$1.

**CREDIT
TERMS**



★ **BOAT
PLANS, PATTERNS
FRAME PACS**

• Over 400 Plans-Patterns, Frame Pak Kits, Prams, Kayaks, Racers, Runabouts, Catamarans, Cruisers, In-Outboards (6' to 40') Wood, Plywood and Steel. **Send 35¢ for 120 pg. Plan Catalog.** Catalog plus "Boat Building Handbook"... Send \$1.00.

Buffalo 7, N. Y.

BEST SPORTS CAR YOU CAN OWN!

A 4-WHEEL DRIVE WITH WARN HUBS

Hi-ball on the highway in free-wheeling 2 w.d. with Warn Hubs on your 4 w.d.—no front end drag or whine, better gas mileage, easier steering. Save money, save road time. Switch in seconds into 4 w.d. when the going gets rough! Change to 2 or 4 w.d. automatically with Warn Lock-O-Matics, manually with Warn Locking Hubs. Guaranteed. Models for all makes 4 w.d.s to 1 1/2 tons. At your dealer's or write:

Warn Hubs, Riverton Bx 6064-B, Seattle 88, Wash.



**WARN
Selective Drive
HUBS**

JEEP OWNERS

Re-Power NOW with a V-8 or 6 Cyl engine—Use

Ford • Chev • Mercury • GMC • Pont • Stude • Dodge or Plymouth in Jeeps, Jeepsters, Sta-Wgn, Trucks, Kaiser & H. J. cars. Conversion kits \$45.35 to \$56.90. Want fast action? Give us full information, send \$15.00 Dep. and we will ship correct kit. Bal. COD. Send full amount for prepaid shipment. Wire, phone or write today. Details FREE.

HOOSIER MACHINE PRODUCTS CO.

314 S.E. 6th St.

Phone CR6-3442

Pendleton, Oregon

ELECTRIC WELD - BRAZE & CUT

REPAIR MOST EVERYTHING MADE OF METAL

Home appliances, Auto parts, Farm-garden equipment, toys, Make and repair playground equipment,



lawn chairs, tables, ornamental iron work, gates, wagons, etc. Solder, heat, bend, and straighten, with terrific heat from arc torch. Cut and weld up to 1/4" steel plate. A million uses for Home, auto, farm, inventors, factories, etc. Works from any home 110

volt plug-in. Complete with dark welder's mask, arc torch, supply of carbon welding and brazing rods and complete Welding Instruction Book. Efficient—durable—1 year guarantee. Wt. only 4 lbs.

Send only \$3.00 (cash, ck, mo) and pay postman \$9.95 plus COD postage on arrival or send \$12.95 and we will send postpaid. Ideal gift for mechanically minded home owners, relatives, friends. Order now for early delivery. Available only from:

MIDWAY WELDER Dept. DP5-10 Kearney, Nebraska



"The Master Touch"

Lots of folks are inclined to skip over the important step of "polish sanding" — fine sanding or rubbing between coats. Then they wonder why they don't get that true professional look to their job.

In the photo, dried bubbles and trapped particles are cleared away by hand rubbing with TUFBAK DURITE Paper Sheets, Extra Fine grit 320-A, using water or oil as a lubricant. Fold a standard 9" x 11" sheet twice to make a convenient pad.

In another instance, the first liquid coat on bare wood tends to curl up numerous surface fibers, resulting in stiff rough nubs. Use the same 320-A TUFBAK, dry or with lubricant, on a handy BEAR Sanding Block. Of course, repeat the polishing between additional coats.

Remember for your preliminary rough sanding, use BEAR ADALOX paper for a quick, easy job. ADALOX sands much faster than ordinary sandpaper — cuts down on the uninteresting part of the job. Dept. PC-10, BEHR-MANNING Co., Troy, N. Y., a division of Norton Company.



Abrasives

put **SKILL** in your hands

Dremel MOTO-TOOL

In your workshop, on your job — it's the handiest tool you'll ever own! Moto-Tool is ideal for precision grinding, polishing, carving, drilling, engraving, deburring, sharpening — does fine detail work with pin-point accuracy. It eliminates time-consuming hand work, gives the finished job a professional look. Moto-Tool weighs only 13 oz. — fits your hand like it belongs there. Fastest, most powerful tool of its kind — develops 27,000 rpm! Widely used by tool and die makers, model builders, craftsmen, lab technicians, repairmen, gunsmiths, schools.



Moto-Tool Kit No. 2
with steel case \$27.50
No. 2 Moto-Tool
only\$19.95

See your dealer or write
for free catalog.

DREMEL MFG. CO., Dept. 120-K, Racine, Wis.
Quality Power Tools Since 1934

132

**FREE
CATALOG!**

**TREMENDOUS SAVINGS ON
HUNDREDS OF SURPLUS AND
NEWLY MANUFACTURED ITEMS!**

New 1960 edition contains over 50 pages of tools and equipment for farm, home, workshop, factory. Hydraulic equipment, pumps, motors, construction and diesel equipment and parts! Write for your **FREE CATALOG** Today

GROBAN SUPPLY COMPANY

1139 South Wabash Ave., Dept. F-10 Chicago 5, Ill., WEbster 9-3793

new **FORMICA**® table top?

Laminated Plastic



It's easy when you use (1) Formica Safe-Bond, the new non-toxic, non-flammable adhesive that "tells" you when to contact and (2) Formica laminated plastics in the smart new Raymond Loewy designs. Get Formica Safe-Bond and sheet stock at your local lumber dealer. Formica Corp., a subsidiary of American Cyanamid, Cincinnati.

a product of

CYANAMID

When Will We Start Burning Water?

[Continued from page 106]

building of new water-burning engines.

In experimental reactors, these bared particles are shot through the chamber at speeds of thousands of miles a second in the hope that enough of them will merge to keep the "fire" going, and the greater the heat, the more the power-giving mergers. It is something like burning wet wood—if the fire is hot enough, you can do it.

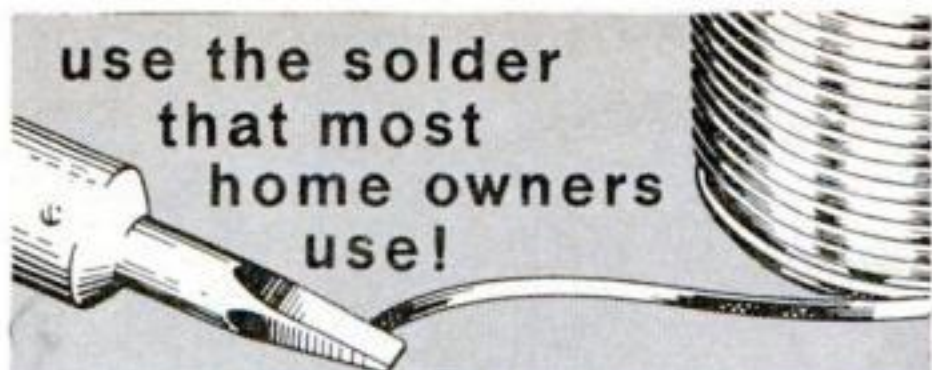
But heat is only a whip to speed up the particles; the big idea is to smash enough of them together to get sustained fusion. If you get them down the track fast enough, you can give or take a few million degrees and it won't matter. Such uncertainties lend a fine sporting spirit to the whole enterprise.

Most American work is grouped under Project Sherwood of the AEC and performed in laboratories at Oak Ridge, Los Alamos, the University of California, and Project Matterhorn at Princeton University. The AEC also finances projects at eight other universities, and more work is being done at the Naval Research Laboratory in Washington and by several large corporations.

One of the most spectacular new experimental fusion engines is the "Stellarator C" now being built by Matterhorn in a 70-acre field near Princeton at an estimated cost of 34 million dollars. The newest and most hopeful of a series of "oval racetrack" devices, it is the concept of Prof. Lyman Spitzer Jr., Princeton astronomer, who has been working on the plan for nine years.

Three 90-ton flywheels will store the energy of big electric motors and deliver it in short bursts of enormous power. Some day next year a charge of deuterium atoms will be kicked around an 8-inch tubular oval, 40 feet to a lap, at a hoped-for temperature 10 times that of the center of the sun. A staff of more than 100 scientists and engineers are busy outwitting the gremlins and hoping for a big stride toward a workable engine.

"This plant is only a laboratory," Dr. Melvin B. Gottlieb, Matterhorn's associate director, explains cautiously. "It is not designed to produce useful power. No one yet knows how to build a fusion reactor, and no one knows if it can be made to pay. Everyone knows you can



use the solder
that most
home owners
use!

KESTER SOLDER

For your electrical work, radio-TV, do-it-yourself projects . . . always use the best . . . KESTER SOLDER. Send for FREE 16-page book that tells you how!

KESTER SOLDER COMPANY

4254 Wrightwood Avenue • Chicago 39, Illinois

OVER 60 YEARS' EXPERIENCE IN SOLDER AND FLUX MANUFACTURING



119 JIG SAW PATTERNS

FULL-SIZE . . . trace on wood and saw out. Clever, ORIGINAL designs, things you can make to SELL. Wall shelves, lawn signs, planters, book ends, others. **\$1** postpaid

BURGESS VIBROCRRAFTERS, INC.

Rush \$1 today. DEPT. C-175, Grayslake, Illinois

SAVE MONEY! MAKE MONEY! WITH PORTABLE CEMENT MIXER!

It's easy, fast, fun to do your own work with the MIXAL Mixer. Build barbecues, patios, sidewalks for yourself, for others! Mixes 3' x 8' sidewalk every hour! Uses any 1/4 HP motor. Thousands used by contractors! Try it on MONEYBACK GUARANTEE! Send for FREE HOW-TO-DO-IT CEMENT MIXING BOOKLET.



29⁹⁵ pp

KOL, INC., Dept. P5-10, 2323 Ellis Ave., St. Paul, Minn.

See Page 61 for
Home Improvement
Holiday Contest

WHEELS OF FREEDOM

The American Automobile Industry will be honored this month with a special new U. S. Commemorative postage stamp. It will be issued for the first time on Oct. 15th. We will send you a beautiful engraved envelope carrying this new stamp for **only 25c**. It will be posted on its first day of issue at Detroit—the only place where the stamp will be available that day. This will be an historical envelope of outstanding interest and beauty and will be especially marked by the Post Office on this occasion. **Special this month—10 all different First Flight JET AIR-MAIL covers for only \$4.95.** Money back if not completely satisfied. Ask for lists of other covers.

K. M. WALSH Box 308-K TUCKAHOE, N. Y.

BUILD THE BEST ELECTRONIC EQUIPMENT



it's fun to build
years-ahead money-saving

knight-kits[®]
A PRODUCT OF ALLIED RADIO

featured in the

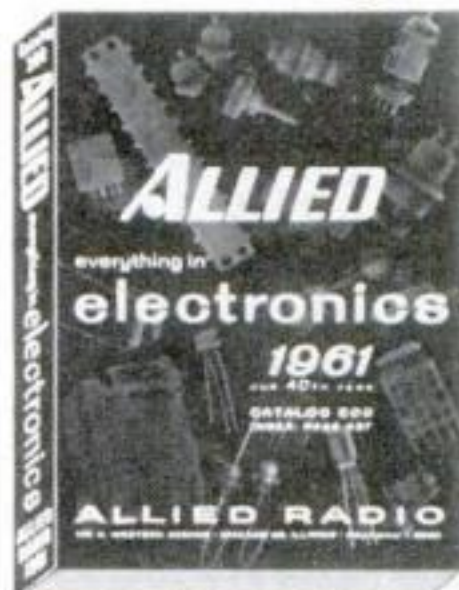
ALLIED

Big 444-Page 1961

ELECTRONICS
CATALOG

free

build-your-own..
it's easy..it's fun



BIG SAVINGS

See the exciting 1961 line of KNIGHT-KITS—available only from ALLIED. They're lowest in cost, convenience-engineered for easiest assembly, outstanding for performance—the only kits offered with Free Inspection Privilege. Send today for the 1961 ALLIED Catalog—select your KNIGHT-KITS—and...



KITS FOR
ANY NEED

Hi-Fi
Hobby
Instrument
Amateur

SAVE ON EVERYTHING IN ELECTRONICS



Get more for your money in: Stereo hi-fi systems and components • Recorders and tape • Amateur station equipment • Citizen's 2-way radio • TV tubes, antennas, accessories & test instruments • Electronic parts, tubes, transistors, tools • Send today for your FREE 444-page 1961 ALLIED Catalog!

only \$2 down
on orders up to \$50

**FREE
catalog**



ALLIED RADIO

ALLIED RADIO, Dept. 27-K

100 N. Western Ave., Chicago 80, Ill.

☐ Rush FREE 1961 ALLIED Catalog.

Name _____

Address _____

City _____

Zone _____

State _____

WISE-GRIP®



**DOES
MORE JOBS
EASIER THAN
ANY OTHER TOOL**

**AT YOUR
DEALER**

only
\$2.15
to
\$2.95



PETERSEN MFG. CO.

Dept. No. PS-10
DE WITT, NEBRASKA

COMPACT! *Maximum Performance*



Model 2D12

WEBSTER ELECTRIC

TRANSISTORIZED POWER CONVERTER

Where space is a factor and only 12 volt power is available, this Webster Electric Power Converter provides exceptional performance from an unusually compact unit (2" high x 2" deep x 4½" long — weighs only 12 oz.). Ideally suited for receivers and low-powered transmitters in mobile equipment. It converts 12 volts into 250 volts DC — features automatic overload protection; mounts in any position. There are no moving parts to wear out or lose adjustment. Regulation exceeds that of mechanical converting equipment.

COMPONENTS DIVISION

WEBSTER ELECTRIC

RACINE · WIS

6-173

When Will We Start Burning Water?
 get gold from sea water, but it costs too much."

Meanwhile, sharply competitive teams throughout the world are building about a dozen other experimental machines with equally high hopes and cautious predictions. Everyone has run into unexpected trouble. Six years ago the British built a doughnut-shaped device named Zeta. The first tests in 1957 seemed promising. Then they were dismayed to find that they were not getting results that would lead to a practical plant. Now the British are testing various designs.

The world's biggest machine, Russia's OGRA, has a straight cylinder so big that a man can walk through it. It doesn't work because of a newly discovered "revolutionary movement among the electrons," reports Dr. B. A. Trubnikov, who believes they can be controlled in a monster tube about 35 feet in diameter.

Many U. S. scientists are skeptical about giant devices at this stage, and believe faster progress can be made by testing a variety of smaller gadgets. Dr. James L. Tuck of Los Alamos, who years ago named his first crude device "Perhapsatron," announced early this year that he had reached the goal of a "true thermonuclear reaction" in a device called Scylla, which heats a blob of plasma the size of a robin's egg to 13,000,000 degrees for about 7/1,000,000 of a second. Although other scientists challenge his statements, he is working now on a bigger reactor.

At the Livermore branch of the University of California Radiation Laboratory, another team pins discreetly qualified hopes on a straight-tube reactor with "magnetic mirrors" at both ends, which contain the particles by batting them back and forth. Preheated charges of the fuel are injected in pulses, then compressed by the magnetic field to the heat of fusion, somewhat as in a diesel engine. Oak Ridge and the Russians are experimenting with variations of this idea. At least six different approaches will be tested in the United States within a year.

If and when all problems are solved, how will such an engine be used? Prophets foresee tremendous electric power

When Will We Start Burning Water?

plants—the bigger, the more efficient—located near bodies of water from which they will extract their fuel. There will be no danger of using up all the heavy water in Lake Michigan, for instance, for streams and rainfall would constantly renew it. Fusion-power plants, the prophets say, will never be suitable for small installations, remote villages, or mobile equipment; but when the world's oil is exhausted, they may charge long-lived batteries to run electric automobiles.

It may be that the first fusion plants will use another kind of fuel—deuterium mixed with tritium, a triple-heavy hydrogen atom that is fantastically rare in nature. It is highly radioactive stuff made by the AEC for use in the H-bomb, and costs about \$500,000 a pound. This fuel mixture would react at much lower heat than deuterium alone, minimizing many problems. Tritium can be made by bombarding lithium, and if the reactor were encased in a blanket of this metal, it would "breed" more of the costly fuel than it would use, thus more than defraying the cost of the original charge. Professor Spitzer once drew up plans for a hypothetical plant of this type, and calculated that construction costs would be within reason, and that it should make electricity at about the price of today's coal-burning plants.

Target date? No one can predict when practical fusion power plants will start operating. The tough-minded Dr. Teller puts it like this: "The question is whether we will burn rocks or water when our coal and oil are used up. I am confident that we will eventually burn water, but you have to fly kites before you build planes. I tell builders of today's atomic plants that they needn't worry until about the year 2000. By that time, fusion power may present strong competition. Of course some clever person may devise a more effective plan that will speed up the program, but if anyone thinks he can burn water in 10 years he is probably mistaken."

Many fingers have been burned since the great idea was first conceived, and pessimism is in style; but other scientists are brash enough to believe in a shorter time schedule. With many determined experimenters at work, someone may hit the jackpot.

JUST PURCHASED THE MOST FANTABULOUS BUY IN OUR HISTORY! 10,000 DOUBLE ACTION HYDRAULIC CYLINDERS...

All sizes, bores and strokes. This purchase made possible by a contract termination on mobile equipment. NOW offered to you at "once-in-a-lifetime", LOW - LOW Palley PRICES. Compare - Buy NOW for future needs and insure against breakdowns. Engineered for Earth Moving Equipment, Presses, Tail Gates, Agriculture Equipment, Industrial Machines, Lift Assemblies, Oil Fields, and hundreds of other uses requiring unusual strength and durability.

ATTENTION PURCHASING AGENTS for Mfrs., City, County, State and Government Agencies. All inquiries promptly handled. Send for special Hydraulics Brochure on other hard-to-find Hydraulic Equipment.

Part No.	Bore	Stroke	Length	Eye-to-Eye	Shaft Dia.	PRICE
H-70A	2-1/2"	8-3/8"	18-3/4"	1-1/2"	1-1/2"	9.88
H-70B	2-1/2"	10"	21-1/4"	1-1/2"	1-1/2"	10.88
H-70C	2-1/2"	15"	26-1/8"	1-1/2"	1-1/2"	12.88
H-70D	2-1/2"	23-3/4"	35-1/2"	1-1/2"	1-1/2"	18.88
H-70E	2-1/2"	30"	40-1/2"	1-1/2"	1-1/2"	24.88
H-70F	2-1/2"	48-1/2"	64-3/8"	2"	2"	29.88
H-70G	3-1/2"	8"	19"	2"	2"	17.88
H-70H	3-1/2"	10-1/4"	21-1/4"	2"	2"	19.88
H-70I	3-1/2"	15-1/8"	26-1/8"	1-3/4"	1-3/4"	23.88
H-70J	3-1/2"	22-15/16"	34-1/4"	2"	2"	29.88
H-70K	3-1/2"	30"	41"	1-3/4"	1-3/4"	34.88
H-70L	3-1/2"	43-1/2"	55-1/8"	1-3/4"	1-3/4"	44.88
H-70M	3-1/2"	47"	64-1/2"	2"	2"	49.88
H-70N	5"	55 1/2"	43"	2 1/4"	2 1/4"	79.88

**2,500-Lb. LIFT
WINCH HOIST
NOW
37.50**

Has 24 to 1 gear drive with a bronze worm gear. Has 3-speed crank, free-spool clutch & 18ft. of 3/16" cable. MOUNTING FRAME extra - \$5.00

**TELEPHONE
REPEATER
AMPLIFIER
4.88**

COST GOV'T
Approx. \$200

Made to amplify signals & maintain load balance in phone circuits. Can be used to fire dynamite. Loaded w/tubes, switches, rheostats, etc.

**2,500 PSI
CORNELIUS
AIR
COMPRESSOR**

Has 1/3 HP, 27 V. DC motor. Delivers .04CFM at 2500 PSI. Use where high pressure air is needed. Comes in metal carrying case. Cost Gov't approx. \$629 **32.50**

**1/2 HP
MOBILE AIR
COMPRESSOR
99.50**

Delivers 90 PSI. Adjusts up to 125 PSI. Displaces 2-3/4 cu. in. per minute. With automatic pressure switch, relief valve, gauge, pressure regulator, hose and blower. Has 10 gal. tank and wheels.

Stainless Steel J-1 AIR TANKS - Size: 24"x45". Capacity 18000 cu. in. \$95.00

Stainless Steel G-1 AIR TANKS - Size: 12 1/2"x24". 400PSI test. \$11.95

**MECHANICS
COVERALLS
3.88**

herringbone twill. Four large pockets. Sizes: Small and Large. Cost \$22.00

**ASTRO
COMPASS
ONLY 9.50**

Gives true heading, determines bearing and compass errors. Orig. cost \$87.50

**B-16
MAGNETIC
COMPASS
9.75**

Precision inst. w/floating card. Adjustable cage. For car or plane.

**8 POWER
ELBOW SCOPE
ONLY 9.88**

Field 325 ft. at 1000 yards. 2" objective lens and Kellner eyepiece.

**Gear Head
MOTOR**

Use to turn antenna, open or close doors, etc. It turns at 1 R.P.M. Set to 90° turn, can reset to a 360° turn. **3.88**

**2 TO 1
SPEED REDUCER
14.75**

Gear ratio gives approx. 90 RPM w/direct drive 1750 RPM motor. Operates timing devices, etc.

1500 PSI GEAR PUMP & MOTOR

1 1/2 HP, 24V DC motor. Del. 3 1/2 GPM. \$8.88

1500 PSI 4-WAY HYD. VALVE -

Sliding piston type. Reg. \$12.75 - **7.88**

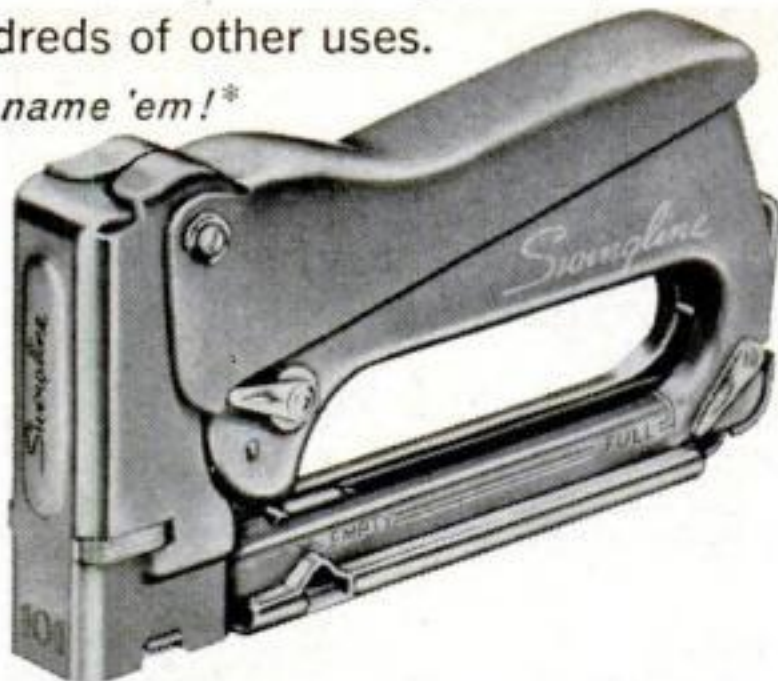
palley's
2263 E. VERNON AVE., Dept. PS-100
LOS ANGELES 58, CALIF.

TO ORDER: Send Check or Money Order. 1/2 dep. with C.O.D.'s. All items shipped postage or freight collect.

screens, upholstery, carpets...

hundreds of other uses.

*You name 'em!**



Swingline 101 Staple Gun

Staples practically anything. Exclusive push-button loading and built-in staple extractor. At your stationery, department or hardware store.

only **4⁹⁵**

**Win \$5 per Idea!*

Send for FREE
12-page booklet
"Tips for Tacking."

Swingline pays \$5 for each practical new idea on how to use the SWINGLINE STAPLE GUN...to be published in "Tips for Tacking." Send your ideas today!



Swingline INC.

38-00 Skillman Ave., Long Island City 1, New York

NEW BELSAW MULTI-DUTY POWER TOOL SAWS—PLANES—MOLDS



Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture... ALL popular patterns. RIP... PLANE... MOLD... separately or all at once with a one HP motor. Use 3 to 5 HP for high speed output. Low Cost... You can own this power tool for only **\$30.00** down payment.

Send postcard today for complete facts.

BELSAW POWER TOOLS, 921 Field Bldg., Kansas City 11, Missouri

PEEL PAINT OFF



Furniture



Floors



Boats



Woodwork



KLEAN-STRIP PAINT REMOVER

Fast • Clean • Non-inflammable

THE KLEAN-STRIP CO., INC.

2340 S. Lauderdale, Memphis 6, Tenn.

Buick, Olds, Pontiac Go Compact

[Continued from page 76]

Warm water flows from the left cylinder head to the front of the "first floor" of the manifold. It runs to the back of the manifold, then up to the front again and out to the radiator. This steady stream of hot water around the intake passages controls fuel mixture better than the usual hot spot or carburetor stove. It eliminates heat-riser valve maintenance and sticking.

Transmissions. To provide automatic shifts for the BOP cars, the engineers adapted standard machinery. They lightened and simplified it—and then worked in some cute new tricks.

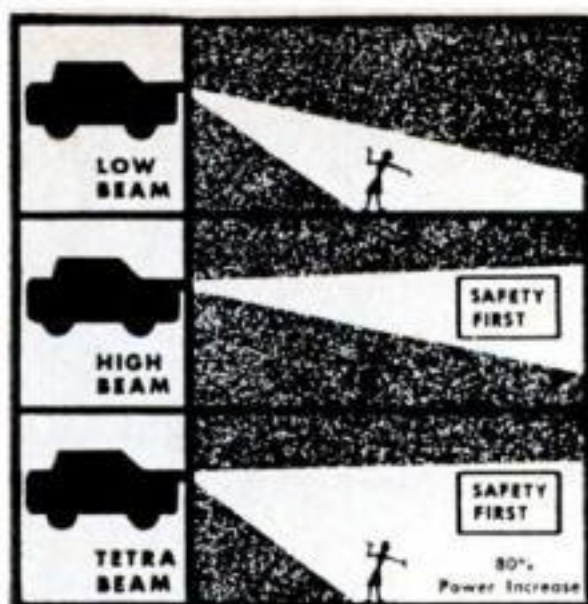
The Buick Special's automatic is a torque converter with gears, like the big Dynaflo. The new idea is torque-splitting. Above certain speeds, which vary with the throttle opening, a clutch routes 37 percent of the torque directly through gears to the output shaft. This 37 percent bypasses the converter. The rest of the torque goes to the converter to be multiplied, then to the gears.

The Olds F-85 automatic has three speeds forward (instead of the four on the regular Hydra-Matic). And it has something Olds salesmen will call "Accel-A-Rotor." This gizmo is a torque multiplier that changes the transmission ratio in first gear. You start up with a numerically high ratio, 3.64:1, for getaway. But then the ratio automatically decreases to 3.03:1—just when depends on throttle opening—before the transmission drops into second gear. You blast off from the stops, yet gently ease toward cruising.

The Tempest's automatic transmission is a torque converter with planetary gears, like the Special's. But this gearbox not only splits torque, it is split itself. The gearing, pumps, and clutches fit in a housing ahead of the differential. The torque converter rides behind the differential. Concentric shafts run through the differential, joining the two parts of the transmission.

The hump-and-tunnel problem. Pontiac, with a transaxle, knocks it out, practically. Buick and Olds jab at it.

First they took advantage of the smaller transmissions to pare the hump. Then they split the drive shaft in two, angling the front half sharply down so that the rear half—and its covering tunnel—would



UP TO 80% MORE LIGHT

HAVE YOU SEEN THE LIGHT
TETRA-BEAM for all two headlamp autos.
ARE YOU DRIVING WITH THIS AMAZING
NEW LIGHT? — — —

- INSTALL
COMPARE**
- GREATER VISIBILITY
 - INCREASED ILLUMINATION
 - WIDE ANGLE LIGHTING
 - COMPLETE KIT
 - SIMPLE INSTRUCTIONS
 - 30 MIN. INSTALLATION
 - WRITTEN GUARANTEE

ORDER AT ONCE

**ONLY
\$3.98**

Plus 32¢ for
Postage and
Handling

RAPID RELAYS INC.

Dept. 5

146 Orange St. Mansfield, Ohio



CHIPPER CHARLIE

Never been sick a day in his life. But he knows it can happen to him—so he gets a health check-up every year—just in case. He also supports the American Cancer Society's Crusade. Send your contribution to "Cancer," in care of your local post office.

AMERICAN CANCER SOCIETY



IMPERIAL Brush Cleaner

**Cleans
Fast**



No mixing, no long soaking of brush. Leaves bristles like new—glossy, springy—never flabby. Effective on hardest caked paint and other finishes. At paint and hardware stores.

● Send 25c for illustrated Refinishing Manual or write for free folder "Care of Paint Brushes." Wilson-Imperial Co., 121 Chestnut St., Newark 5, N.J.

If it's worth painting
it's worth sanding...
with sandpaper by



CARBORUNDUM®

(Item 24)



World's THRIFTIEST Light Plants

700 Watt, push button start, 115 v. 60 cyc. AC. 2.2 HP, easy starting Briggs eng. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. \$275... **\$143.50**

1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output... **\$199.50**

**ELECTRONIC BRAIN Now Available On All Our Plants—Write
MASTER MECHANIC MFG. CO., Dept. B-106 Burlington, Wis.
Southern Customers Order from Dept. B-106, Box 65, Sarasota, Florida**

BIG Profits in arc welding!

earn extra money with these low cost welders



"HUSKY BOY" air cooled arc welder



Shop Type AC arc welder

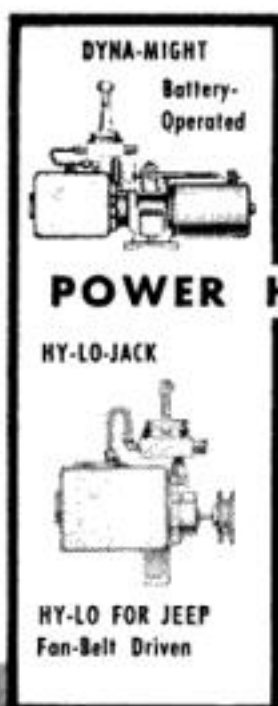


"Handy Andy" home type welder

One of these low cost Hobart Arc Welders will immediately set you up in a highly profitable business—enabling you to capitalize on the ever expanding demand for emergency repair and

construction jobs. Hobart welders give high efficiency at low cost—let you weld right on the spot—saving costly tear-down and assembly. Write for complete details—no obligation.

HOBART BROS. CO., Box P-100, Troy, Ohio, phone FE 2-1223



instant up-and-down action

MONARCH

POWER HYDRAULIC CONTROLS

for snow plows

One man controls the plow from the cab . . . instant up-and-down action with the flick of a wrist. Snow removal is easier, faster, more economical with Monarch. See your dealer. Write for illustrated folder.



MONARCH ROAD MACHINERY COMPANY

1331 Michigan St., N.E.

Grand Rapids 3, Michigan



The Modern PLASTIC
for lasting Home Repairs

PERMANENTLY mends cracks or holes in wood, tile, stone or plaster. Sticks and stays put—Does not chip, shrink or fall out. Easy to use. Economical. Mold it, chisel it, polish or paint it. The big 4-lb. can is obtainable from your lumber, paint or hardware dealer at \$1.40; or will be shipped direct postpaid (in U. S.) for \$1.75. Complete satisfaction guaranteed or your money refunded. Order now.

DONALD DURHAM CO.

Box 805-U Des Moines, Iowa

Turner Torch

90th Anniversary Special!



The famous Turner Torch . . . for soldering, light brazing, thawing frozen pipes, burning weeds, removing paint, laying tile and hundreds of uses . . . now on sale with the green tank that contains 10% more fuel than any other disposable tank.

SAVE \$1.00. Buy the regular Turner Torch now with two tanks for only **\$7.89** complete

Available wherever hardware is sold or write

Turner Corporation

841 Park Avenue

Sycamore, Illinois

Buick, Olds, Pontiac Go Compact
be low. The two halves of the drive shaft are coupled with a constant-velocity universal joint.

There's a reason for the un-Detroitlike use of such an expensive gadget. The old penny-saving trick of using two regular U-joints set 180 degrees apart wouldn't do with a one-joint layout—it would let the shaft segments rotate at varying

NEXT MONTH IN PS . . .

See the pictures, get the facts, as the rest of the '61 cars are unveiled:

Rambler American
Corvair—sedan and wagon
Ford and Corvair compact trucks
Chrysler, Cadillac, Lincoln
Chevy, Olds, Mercury, Ambassador
Thunderbird and Corvette

speeds. That would have caused vibration, which would be worsened by the sharp angle between the segments.

Running gear. The Tempest, thanks to its rear-mounted transmission, has swing axles to let the two back wheels jounce up and down independently. There are coil springs all around.

The F-85 and Special also have coils at all four wheels, but only the front ones are sprung independently. A conventional solid rear-axle housing ties the two rear wheels together. Two trailing arms on each side, forming a triangle with the rear axle, join the axle and differential to the body's integral frame rails.

These arms are rubber-mounted to insulate the body against noise and vibration. The outer arms, between the ends of the axle and the frame rails, transmit driving and braking forces and also control vertical stability. The shorter inner arms run from the frame to the differential and control lateral stability.

In all three cars, the front suspension comes as a complete package, fastened to a separate front cross member. The steering gear is also attached to this cross member. The whole works—cross member and its attached hardware—is held to the body side rails by six bolts. Here, too, rubber cushions keep noise and vibration from drumming through the unit bodies.

WAR SURPLUS AND OTHER BARGAINS SAVE UP TO 90%



COMPLETE 2-WAY TELEPHONE SYSTEM

For that extra phone in the home, shop, farm, school, etc. Excellent intercom with 2-way buzzer system. Mfd. by Western Electric. Can carry clear conversation for miles. Not a toy. Wt. 11 lbs. Complete with battery & 50' weather-proof wire—ready for use. All this for only **\$13.95**.

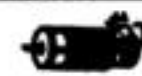
ELECTRIC PUMP WITH CONTROL UNIT

Runs on 12 or 24 V. Centrifugal type. Draws 5.2 AMPS. Has built-in removable filtering screen. Great for bilge, circulating or sump pump... bait tanks, etc. Pumps 500 GPH. Complete with variable control rheostat. Explosion-proof motor. Mfd. by Ingersoll-Rand. Shpg. Wt. 7 lbs. Approx. GOVT. COST \$195. NEW **\$8.95**.



BUILD YOUR OWN ARC WELDER, LIGHT PLANT OR BATTERY CHARGER \$37.50

Kit incl. 1 Navy NEA-5 Gen. combination AC-DC type. AC 115 V. DC 24 V., 200-300 Amps. 2 complete generators in 1, yet no larger than reg. gen. Ideal for home, shop and farm lighting plants. Delivers 1200 Watts AC. DC side for charging batteries, welding and operating war surplus motors. Also in kit: 2 Voltage Regs., AC & DC, Reverse Current Relay, 30' New Welding Cable, 1 Ammeter, Rheostat, Electrode Holder, Toggle Switch, Welder's Shield, Wiring Diagram for kit. Wt. under 100 lbs. Approx. GOVT. COST \$650. Kit—**\$37.50**. Navy NEA-5 Gen. as above, purchased separately, **\$23.50**.



R3 GENERATOR Terrific for making arc welder. 3000 RPM. 30 V. 300 AMP output. Approx. GOVT. COST \$750. Like NEW. **\$29.95**.



AIRBORNE ALL-PURPOSE ELECTRIC WINCH

Fully bearinged 3 HP motor with a reduction of 240 to 1. Will operate on 6, 8, 12, 24 or 32 V. Will lift up to 2 tons. Safety clutch set at 3 tons. Fully reversible. Adjustable hand brake and lock. Drum will handle over 500' of 1/4" steel cable or 5/8" rope. A terrific, compact power takeoff for beaching boats, etc. Will work off any battery within the range from 6 to 32 V. Cost of this unit is less than an installation for a competitive brand. Shpg. Wt. 150 lbs. Complete, ready to run (less cable). Dim.: 8" W x 34" L x 18" H. NEW, **\$99.50**.

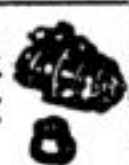
"DELUXE 11" ARC WELDING KIT

Consists of 200 AMP. Gen., voltage reg., ammeter, shunt, adjustable helmet, electrode holder, pr. welder's gloves, 30' welding cable, reactor coil, toggle switch, rheostat. Approx. GOVT. COST \$650. Units guaranteed pre-tested. **\$34.95** complete.



140-1 REDUCTION GEAR

For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor & clutch. Easily reversible wiring diagram furnished. Hi torque, 105 RPM. Runs on 6-12 or 24-32 V. 65 lbs. gross. Approx. GOVT. COST \$300. **\$12.00**. Matched splined gear—**\$3.00** ea. **\$225-1** Reduction Gear—**\$13.50**.



NEW 1961 CATALOG! Tremendous catalog—our biggest ever—fully illustrated—1000s of bargains in war surplus & other items. Send 25c in coin for your copy today or free copy with order. Where ppd. indicated applies to US only. Other prices FOB Culver City, Cal. Send cash, check, money order. 50% dep. COD.



AIRBORNE SALES CO., INC. DEPT. PS 1060
8501 Stellar Drive, Culver City, Calif

HOW TO TURN Concrete INTO Gold



A MUST FOR EVERYONE CONCERNED!

This MANUAL Tells You How To Make Handsome Profits From Concrete Items YOU CAN MAKE

All you need is a mold or two and a little determination. This Manual contains large, clear pictures, gives prices and description of more than 200 different molds you can buy direct from the manufacturer, AND...priceless trade secrets that make production a snap. Take the first step Today!!!

SEND ONLY \$2.00 FOR YOUR COPY
(Rushed to you by First Class Mail)

CONCRETE MACHINERY COMPANY, INC.
Dept PS Hickory, N. C.

Does your project require Finely Woven WIRE SCREENING?

Highest quality bronze wire cloth now available at a fraction of its original cost

We can furnish top quality remnant trims of extremely fine bronze wire cloth from 1/2" sq. to any size your projects require. Write, advising size and possible quantity requirements. We will gladly provide free sample.

WISCONSIN WIRE WORKS
APPLETON • WISCONSIN

WALKIE TALKIE RADIO SENDING SET

YOUR OWN POCKET SIZE RADIO STATION
Talk to any house or car radio without wires or hookups of any kind! Wt. only 1 1/2 lb. Size: 1 1/2" x 2 1/2" x 4 1/2". Built-in antenna. "Break-in" on regular radio broadcasts with "Dial Setter" and "Push-to-Talk" switch. Self-contained flashlight batteries—Power transistor! Talk to radios in the same building and to cars or between cars up to one block or more away—depending on local conditions. No license or permit needed! Practical and real fun in a million ways. Guaranteed to work —1 year service guaranteed.
SEND ONLY \$3.00—(cash, ck, mo) and pay postman only \$9.95 plus COD postage or send \$12.99 for postpd. delivery. Shipped complete ready to operate with instructions for all kinds of operation. New 1961 Model Radio Talkie is now Super-powered! Order yours now—Today! Available only from: **WESTERN RADIO, Dept. TPS-10, Kearney, Nebr.**



CRAFTSMEN—GET NEW 132 PAGE CATALOG



WOOD

and Workshop Supplies, Equipment
World's Largest Selection, Rare, Fancy & Imported Woods, Mosaic Tile, Lamp and Upholstery Supplies, Tools & Hardware!
ALL AT MONEY SAVING PRICES!...

NOW—Stanley Power Tools at Discount Prices!

Send for this complete new wood buying guide and project book. Craftsman is your best, most complete source of finest kiln-dried domestic and rare imported woods, beautiful wood inlays, colorful bandings, matched plywoods, embossed mouldings, carved ornaments, newest woodworking tools, "hard to find" cabinet hardware and fittings... more than 1,600 items! Packed with new patterns, project ideas and money making plans. Enclose 25c (refunded with first order) to help pay mailing and handling cost. Write: **CRAFTSMAN WOOD SERVICE CO., Dept. B-10 2729 South Mary St., Chicago 8, Ill.**

MAKE PERMANENT REPAIRS WITH

Fix 'N PATCH EPOXY ADHESIVE

In Easy To Use Tubes



The Strongest Adhesive You Can Buy! Waterproof; chemical-resistant; can be sanded, painted, drilled & tapped

PERMANENTLY REPAIRS:

- PORCELAIN • MASONRY • STEEL
- CERAMICS • LEATHER • IRON
- ALUMINUM • MARBLE • WOOD
- PLASTICS • GLASS • CORK

MAILCO Send check or M.O. Orders sent postpaid.

JR. KIT **\$1.00**
ECONOMY KIT **\$2.00**

608 KEYSER BLDG. — BALTIMORE 2, MD.

Are drafty windows costing you a

25%

HEAT LOSS?

Why suffer another uncomfortable winter —when it's so easy and so inexpensive to use MORTITE, the "fingertip" weatherstrip. MORTITE comes in a convenient roll . . . goes on in a jiffy . . . off just as easily. Stops wind, rain, snow. Just press in place —no tacks or tools!

Bargain Box for six windows . . . \$1.39.
Junior Box for one window only 29¢ . . . at all hardware, department, building supply and variety stores.



Mortite®

WEATHERSTRIP

The MORTELL Company, Kankakee, Ill.
Makers of famous FOAMFLEX Doorstrip

WELD

BRAZE

SOLDER

CUT

4WAY
ONLY \$14.75
f.o.b. factory
WELDER

Complete with Twin Carbon Arc Torch and accessories . . . to handle all metal-craft work.

Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 volt AC or DC line. The ideal gift with a life-long use. Order today on 10 day money back guarantee. Send only \$3.00 today. Pay Postman balance C.O.D. plus charges. Literature on larger equipment on request.
FOUR-WAY WELDER CO., Dept. F3-K
1810 S. Federal St. • Chicago 16, Ill.

DRAINS cellars, cisterns, wash tubs;
IRRIGATES - CIRCULATES - SPRAYS

1,001 uses. Stainless shaft. Won't rust or clog! Uses 1/6 HP motor or larger . . . 1/4 HP for up to 2,400 GPH; 450 GPH 80" high; or 1800 GPH from 25' well. 1" inlet; 3/4" outlet. Coupling included free.
Heavy Duty Ball-Bearing Pump. Up to 5,200 GPH. \$12.95
1 1/4" inlet; 1" outlet.
Postpaid if cash with order. Also other sizes, types.
MONEY BACK GUARANTEE.
LABAWCO PUMPS, Belle Mead 3, N. J.

CELLAR DRAINER "Low Boy" KIT

15 1/2" high
1500 GPH
\$12.95
(less motor)

"High Boy" — 32" high, 3,000 GPH
\$15.95
(less motor)

TOOLS

WHOLESALE

\$100
PUTS YOU IN BUSINESS

Start your own business, sell tools to your friends and neighbors, or buy tools for your own use and **SAVE MONEY \$\$\$**

A MILLION DOLLAR INVENTORY AT YOUR FINGERTIPS. NO STOCK TO CARRY. ORDER AS YOU NEED IT.

BUY AT WHOLESALE PRICES. Extra \$25.00 profit on your accumulated purchases. \$1.00 refund on first purchase or refunded if you are not 100% satisfied.

THOUSANDS!! of Nationally Advertised items of Hand Tools, Power Tools, Machinist Tools, Tool Chests, Paint Sprayers, Light Fixtures, Appliances, Guns, Gifts, Toys and other items too numerous to mention.
WE SHIP COAST TO COAST
Wholesale Discounts up to 50% OFF

SILVO HARDWARE CO., Dept. PS-10 107 Walnut St., Phila. 6, Pa.

A Safety Expert Rates the 1961 Cars

[Continued from page 93]

this type of accident. The engineering department told me that it has yet to hear of a roll-over involving a wide-track model. Indeed, they say that Fisher Body had to greatly exaggerate its standard roll-over test to make a wide-track car turn turtle. As a result, the '61 tread width is even greater, although the car is somewhat narrower in outside dimensions.

Both of these developments are significant safety factors. So, also, is a year's actual road experience with Corvair's forward-mounted gas tank. In last January's issue we speculated on the wisdom of this. The answer provided by a number of crashes is that the location under the driver's feet provides far more structural protection than is afforded the conventional tail-end tank. No crash fires involving Corvairs have been reported, while quite a few have involved conventional cars. As a result, the standard '61 Chevrolet's fuel tank has been moved forward more than two feet and given more structural safeguards. In view of the steadily mounting proportion of rear-end collisions, this is good news.

Visibility. Lincoln Continental's windshield-clearing system includes two new features. First, its huge 18-inch wiper blades, operating in tandem, are driven by hydraulic power (from the return line of the power-steering mechanism). This gives much more positive pressure than either the vacuum or electric types; and enables the driver to set blade speed at any desired rate. Secondly, the windshield washer is actuated by a separate electric pump, giving the driver a water volume ranging from a dribble to a deluge. It is a real advance for foul-weather driving where the major accident factor is impaired visibility.

Good visibility, of course, is vital in good weather as well as bad. Hence, while the seeing distance from the eye to the road immediately in front of the car is improving this year in most lines, vision in the rear quarters has not increased. In fact, with the exception of the Olds F-85, visibility aft is quite limited in the compacts. This is unfortunate in view of the penchant of small-car drivers for darting in and out of small gaps in traffic.

A Safety Expert Rates the 1961 Cars

What happened to the periscope? This brings us back to our long advocacy of a periscopic rear-view mirror, and last year's enthusiasm when the American Optical Company developed an economically workable version. Sadly, the only 1961 model on which you'll find it is the experimental XP-700 Corvette—strictly a paper tiger.

When the AO periscopic mirror was shown to automobile manufacturers, they unanimously hailed it as a significant safety advance. However, the final consensus was typical: "This would be swell for about two years. Then we'd have to change it, and where would we be?" Thus the consuming mania for *change* for change's sake hamstrings a sorely needed safety feature.

One leading safety engineer told me: "When you come out here looking for new developments, you forget that one of our toughest jobs is to *keep the improvements we've already made*. If we can just hold our own in a face-lifting year, we've really scored a victory over the stylists."

Do people care? Over and over you hear the plaintive objection that "safety doesn't sell. The public isn't interested in it." So far the public has done little to contradict this. The sad decline of the seat belt is a case in point. Another is the fad for roof racks. After years of effort to lower the center of gravity, engineers now see their handiwork crowned by roof racks upon which are piled everything but the kitchen sink.

After marked success in selling Detroit on moving control buttons, knobs, and other protrusions behind the steering wheel where they can do less harm, we now witness the sale of over four million statuettes, placed smack in the center of the dash where they can poke out a front passenger's eye in a collision. Finally, the most dangerous type of car built, the convertible, is enjoying its highest ratio of sales in history.

Such things would seem to confirm the industry's historic conviction that the motoring public is none too bright. Perhaps Detroit may finally be compelled to give the motoring public maximum protection by the one means neither Detroit nor the public wants: a Federal law prescribing safety standards, fixed by an unbiased agency.

TUBE REPLACEMENT GUIDE

EVERYONE who uses vacuum tubes NEEDS this new 1960 Expanded Edition TUBE GUIDE. Contains over 2700 direct receiving tube substitutions, including radio & TV receiving tubes, tubes used in



Hi-Fi & Stereo, foreign tubes and TV picture tubes. All tubes suggested for substitution have characteristics similar to those they are to replace, **FIT INTO SAME SOCKET & NEED NO WIRING CHANGE.**

Two chapters cover complete listing of TV Pix tube replacements including newest 110° tubes.

Substitutes given for over 225 foreign tubes. Last chapter lists transistor substitutes. The only complete **GUIDE** featuring all receiving tube substitutions **WITHOUT SOCKET**

CHANGING OR REWIRING. This valuable book will save you **TIME & MONEY** and permit operation of your set even though original tubes are unobtainable.

Guaranteed Money Back in 5 Days if Not Satisfied

\$1 Post-Paid

RUSH COUPON NOW!

H. G. CISIN, Consulting Engineer—Dept. PS-1
Amagansett, N. Y.
Enclosed find \$1. Rush **TUBE REPLACEMENT GUIDE.**

Name

Address

City Zone State



FEET COLD?

Could be that drafty door again!

You don't have to go through another winter with drafty doors! You can prevent colds and sniffles, end chilling floor drafts with **FOAMFLEX** doorstrip . . . the perfect door weatherstrip anyone can install in minutes.

Made of genuine closed-cell, non-absorbent vinyl foam permanently bonded to Ponderosa pine moulding. Fits old as well as new doors. Package contains two 7' and one 3' length plus nails and instructions.

Only \$2.29 at all hardware, department, building supply stores.

FOAMFLEX®
DOORSTRIP

The MORTELL Company, Kankakee, Ill.
Makers of famous MORTITE window weatherstrip



**YOU BUY DIRECT FROM FACTORY
AT SURPRISING LOW PRICE**

THE SAW THAT CAUSED A REVOLUTION!

**THIS 8" TILT ARBOR SAW PUT
POWER TO WORK IN
HALF A MILLION HOMES!**

AT THE PRICE OF A HAND SAW

POWER does it faster, better, accurately! Half a million wood workers use this famous saw to save money, cut time, and make home repairs, building, and hobby work a joy! Our mass production techniques bring you big savings. We offer, at only \$9.95, a machine tool that sold for over \$20 as far back as 1949! Yet this saw actually has more features than our costlier older models. Heavy duty, all cast iron and steel construction. Price includes massive cast mitre gauge, PRECISION GROUND CAST IRON TABLE, patented motor drive fits any motor! We guarantee this saw will do same jobs as ACCURATELY and as WELL as others costing up to \$100. WE GUARANTEE IT—and almost half a million enthusiastic owners agree!

LOOK AT ALL THESE SPECIAL FEATURES. Blade adjusts to any angle up to 50°. Single Hand Wheel Control. Blade raises and lowers; cuts from 0" to 2 3/4". Precision ground cast iron table. Patented Motor Mount transmits full power. Takes standard 8" blades. Saw insert removable for dado heads and other accessories. Shipping weight 25 lbs.

Send check or M.O. \$2 deposit on C.O.D.'s.
All tools sent express collect



Shipped
Complete as
Shown Less Blade

**SAVES WORK • CUTS TIME
FOR ANY HOMEOWNER**
Home Repairs Are Enjoyable When Work Is Easy—Cuts Are Straight. Makes Boat, Hobby Repair, Woodwork Fun to Do...
• RIPS • BEVELS • MITRES • DADOES
• CUTS COMPOUND ANGLES

FAMOUS IRONCLAD AMERICAN GUARANTEE

Try this famous saw 10 days. If you are not satisfied that it does the work of any tilt arbor saw, regardless of price, return for immediate money back refund.

OUR 30th YEAR

AMERICAN MACHINE & TOOL CO.

ROYERSFORD 80, PA.

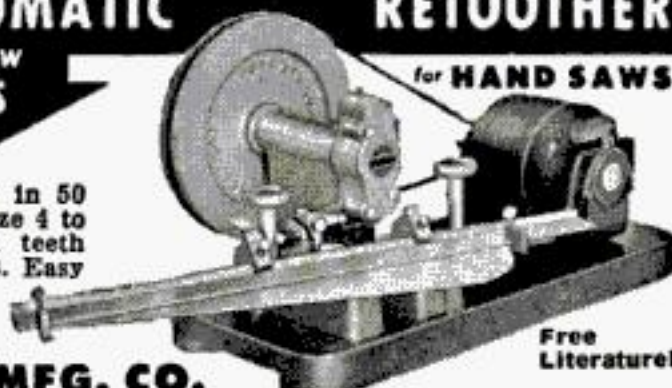
AUTOMATIC

MAKES NEW
PROFITS

RETOOTHER

for HAND SAWS

Cuts new teeth in 50 seconds—any size 4 to 16 points. Old teeth fall off as chips. Easy to operate. A perfect job.



Free Literature!

BURR MFG. CO.

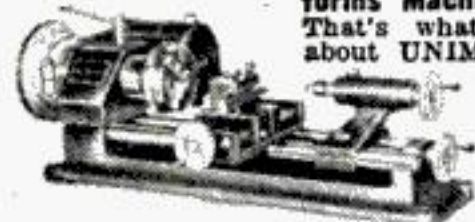
8943-O VENICE BLVD.

LOS ANGELES 34, CALIFORNIA

"MINIATURE MACHINE SHOP"

No Bigger Than A Typewriter, Outperforms Machines Many Times Its Size!

That's what Mechanix Illustrated says about UNIMAT in their 3 page feature story in the May issue. If you want a reprint of this story plus complete information about this amazing 10 in 1 combination precision tool write to:



AMERICAN EDELSTAAL, INC., UNIMAT DIV., Dept. HJ, 350 B'way, N.Y. 13

GUNK® degreases

At better automotive supply and hardware retailers everywhere.



Cleans engines, garage floors, power mowers, greasy walls economically and safely.
In aerosol or pour spout cans.



GUNK CHICAGO CO., River Forest, Illinois

serving the Midwest and Southwest

RADIATOR SPECIALTY CO., Charlotte, No. Carolina

serving the East, Southeast and Far West

What's Coming in the Imports

[Continued from page 95]

available by November. One interesting feature of the unit: If the transmission is accidentally shifted into reverse while the car is moving forward, reverse gear doesn't engage and the transmission loses no teeth.

The new Borgward Big Six four-door saloon should reach these shores this fall. The prestige car has a 2.3-liter, 100-hp. six, basically the same as that of the Isabella, that delivers a top speed above 100 m.p.h.

Porsche. Engines and bodies probably will remain unchanged, but improved brakes and suspensions, successful on racing models, may be adapted to the entire Porsche line within the next few months.

France Jet. This tiny roadster, introduced at the 1960 New York Auto Show, hasn't been imported yet. By the time you read this, however, a contract may have been signed with a U. S. contractor that will put the Jet on sale all over the country. Scheduled changes for 1961 include an American-made 1,081-cc. engine to replace the present 280-cc. unit, and a nine-inch body extension in front. Wheel size of the little car will jump from 10 to 13 inches.

DAF. Informed circles predict complete retooling late next year. The factory isn't letting out any specific information.

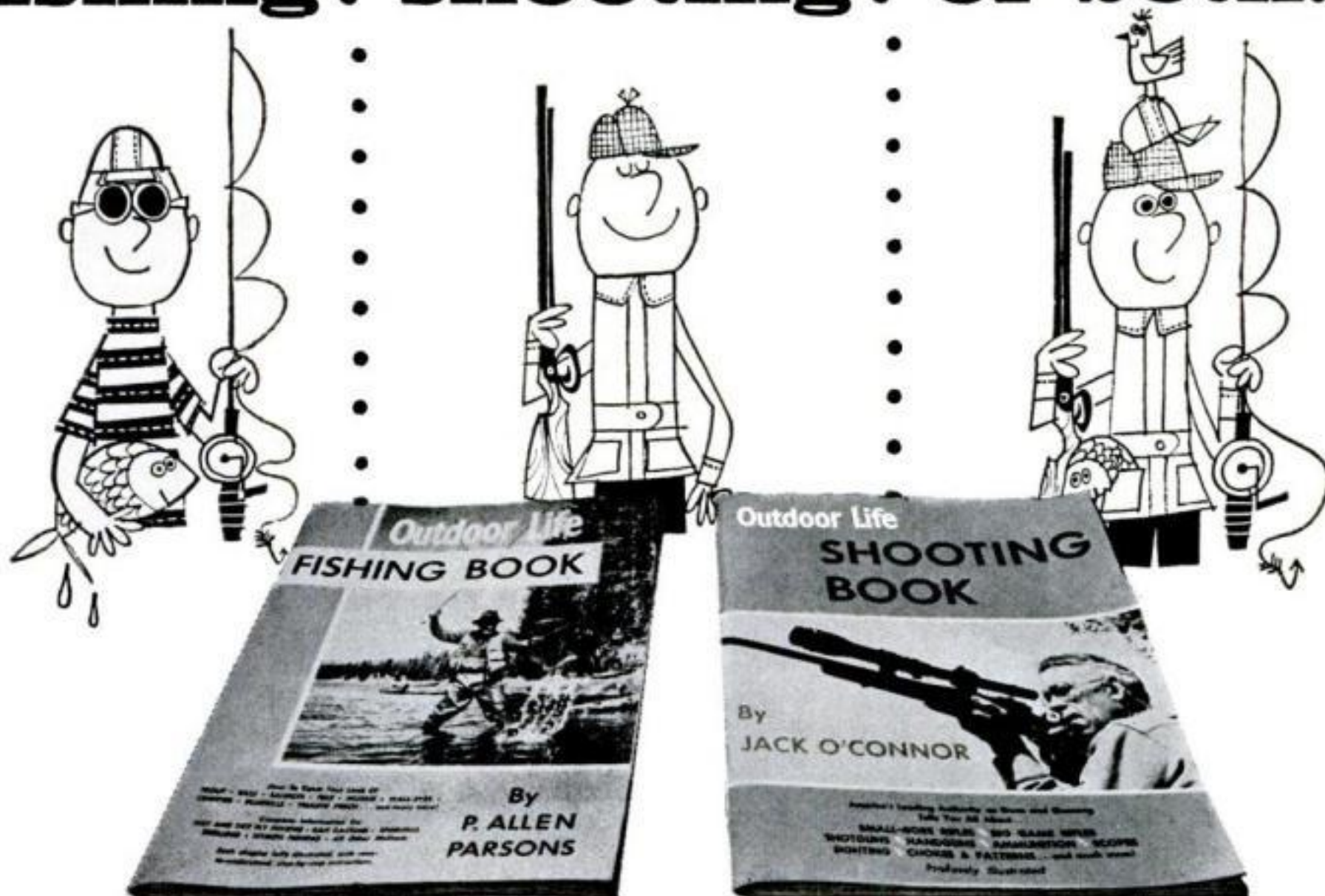
Berkeley. This diminutive sports roadster probably will have a restyled body: new grille, headlights faired into the fenders more neatly. The optional higher-compression engine should become standard in the new model.

Ferrari. A four-passenger car modeled after the 250GT should go on sale late this year. Body styling is new. The GT engine is pushed forward and suspension relocated to make room for the extra passengers. Price and performance will both be as dazzling as the 250GT's.

The California model will have a shorter wheelbase and a suspension reworked for better handling.

Toyota. The Tiara, a new model that has just reached U. S. dealers, should soon be available in two-door station-wagon and pickup form. The current 75-hp. Tiara engine may be warmed up slightly.—Alex Markovich.

fishing? shooting? or both...



Two practical Outdoor Life books for sportsmen—only \$1.00 each

WANT MORE FISH, bigger fish, and more fun getting 'em? Then get the helpful **OUTDOOR LIFE FISHING BOOK** by P. A. Parsons, Associate Editor of Outdoor Life Magazine. **OUTDOOR LIFE FISHING BOOK** is packed with practical data and test-proved tips for landing every kind of fish and getting the most out of every fishing technique. Over two dozen chapters, more than 100 pictures deliver the kind of know-how that produces **quick results** for beginners and oldtimers alike.

You'll get real down-to-earth information on rainbows, brookies, brownies, cutthroats, lake trout, steelheads, small and largemouth bass, muskie, northern pike, pickerel, walleye, crappie, white and yellow perch, white, black and rock bass, bluegill, catfish, shad, etc. **PLUS:** bait and fly casting, spinning, trolling, flies, natural baits, bass bugs and poppers.

OUTDOOR LIFE FISHING BOOK, \$1.00
available in limited quantities, only

JACK O'CONNOR, Shooting Editor of Outdoor Life and America's top gun expert, hands you a million dollars worth of gun and shooting know-how in the big, complete **OUTDOOR LIFE SHOOTING BOOK**. It's loaded with inside tips, expert advice on small-bore rifles, big game rifles, shotguns, handguns, ammunition, scopes, sighting, chokes and patterns, plenty more. Lavishly illustrated with 100 photos, diagrams, trajectory tables, ballistics charts, etc. Large format, fully indexed, handsomely printed.

24 exciting chapters packed with information on: Types of Rifle Actions, Rifles for Woods Deer, Bullets for Deer, Scope for Deer Rifle, The Controversial .270, How Good is the .30/06?, How to Overcome Flinching, Where to Hit 'Em, Hitting Game at Long Range, Choice of Shotgun Gauges, Choke Boring, Shot, Handguns, and plenty more!

OUTDOOR LIFE SHOOTING BOOK \$1.00
is an unbeatable value at only

ORDER ONE OR BOTH BUT MAIL COUPON TODAY

These \$1.00 limited editions, bound in hard-gloss paper are durable and handsome additions to your library. Rush coupon today. Money-back guarantee.

Outdoor Life, 355 Lexington Ave., New York 17, N. Y.

Outdoor Life

PS-1060

355 Lexington Ave., New York 17, N. Y.

Please send me, postpaid:

_____ copies of Jack O'Connor's big, fully illustrated **OUTDOOR LIFE SHOOTING BOOK** at \$1.00 each

_____ copies of P. A. Parsons' big, fully illustrated **OUTDOOR LIFE FISHING BOOK** at \$1.00 each
I enclose \$_____ in full payment.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Avoid Post Office delays. Include your zone number, if any.

GIGANTIC SURPLUS SALE!

STANDARD DIAL PHONE



• Item #716. Genuine W.E. modern, hi-efficiency dial phone. Use for extension to main line on private system. Use several for complete private system. Work on any system. Shipping weight 8 lbs. Cost gov't.

\$29.50. SALE **\$9.25** FOB

DELUXE AIR COMPRESSOR KIT



• For painting, cleaning, tires, termite. Assemble own outfit.
• Item #468. DeLuxe Kit. Compressor, tank, gauge, regulator, paint gun, relief valve, fittings, hose, instructions. Wt. 45 lbs. List \$67.50.

SALE **\$49.50** FOB

AIR COMPONENT BUYS

Compressor \$21.50. Air Tank \$10.95. Regulator \$3.95. Pop Off \$1.75. Gauge \$1.75. Paint Gun \$8.75. Auto Switch \$4.75.

POWER PLANTS



• Amazing buys in DeLuxe Govt. 115-v 60-c plants. Large selection.

ALL FOB

• 1000 W....\$159.95
• 1500 W.... 179.95
• 3000 W.... 249.50
• 5000 W.... 449.50
• 10000 W.. 595.00
• 3000 W DC 169.50

**Write for
FREE
BIG 1960
CATALOG**

Save to 70% on
1000's of Surplus
and New Equip.
Bargains.
Money Back
Guarantee
on all items

EXAMPLE BARGAINS IN NEW CATALOG

\$275.00 Battery Truck-Boat Winch. **\$46.75** FOB
\$112.00 Level-Transit Outfit **92.50** PPD
\$39.50 Motor Vacuum-Blower Unit **6.95** FOB
\$27.95 Battery Charger 6 amps.
6-12V **16.95** FOB
\$380.00 Welding Generator 300
Amp. **19.95** FOB
\$75.00 Hydraulic "Servo"
Cylinder **5.79** PPD
\$80.00 Centrifugal Pump **19.49** FOB
\$245.00 Golf Car Battery Motor... **18.95** FOB
\$39.95 Portable Electric Saw 7" .. **29.95** FOB
\$55.00 Binoculars 7 x 50 with
Case **24.15** FOB

SURPLUS CENTER
LINCOLN, NEBR. DEPT. **832**



Attachable
Cutter Blades



Start your
Business
Electric
Unit Cleans
pipes
3" to 12"

FREE ★ BOOK **CLOGGED SEWERS REMEMBER THE COSTLY PLUMBING BILL—**

Chicago—October 1. Just introduced is a Free Booklet on machines which enable the Home Owner, Janitor or Factory Maintenance Man to Rod-it-himself—Yet anyone can operate this new Rodding Tool which is whirled down the drain in a few seconds. SINKS, BATHTUBS, TOILETS, URINALS, FLOOR DRAINS, HOUSE TO STREET SEWERS can be cleared of Rags, Grease, Paper, Sand while Cutter blades can be added for removing roots. A new discovery in Swedish Music Wire gives the rod 100% more Flexibility.

Another new unit is the Miller Electric Rodder which has patented cutters that expand automatically to the size of the pipe. It will clean out heavy obstructions in pipe diameters 3" to 12". Smaller Sizes available. But now, what are these Tools worth in **COSTLY PLUMBING BILLS SAVED**. Tear this Ad out—and write your name and address beside it for **FREE BOOKLET** on Hand and Electric Units. Obey that urge. No Agent will call. A postcard will do (Chicago Phone Kildare 5-1702)

Miller Sewer Rod, Dept. PR-10, 4640 N. Central Ave., Chicago, 30 ILL

ADJUSTABLE MITER BOX & CORNER CLAMP



Adjusts
to any
angle!

No. 44—COMBINATION MITER BOX AND CORNER CLAMP

Holds the wood and holds your saw. Uses any handsaw for accurate cuts from 0° to 180°. Full 3" capacity. Sides of joints exposed **\$2.75** PPD.

No. 33 Works the same as No. 44, but without saw guide attachment. **\$1.75** ppd.

SAW SHARPENING IS EASY

Super Filer No. 11 joints and sharpens hand and circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, teeth are finished. Saw runs true with no side pull. Includes 8" file. **\$9.95** PPD.



"TRU-CIRCLE"
saw set automatically sets teeth at 10° or more. **\$2.95** PPD.

MONEY BACK GUARANTEE



FREE
LITERATURE

A. D. McBURNEY, 5908 Hollywood Blvd., Hollywood 28, Cal., Dept. S-100

252 POPULAR SCIENCE OCTOBER 1960

What to Do with Your Old Atom Smashers

COLLEGE laboratories in the U. S.—always running short of something they can't get along without and lacking funds to buy it—soon will have a huge scrapbox to rummage through in emergencies.

Just as the home handyman squirrels away his bits and pieces in old tobacco tins against a day when he or a neighbor is sure to need that certain bit of wire or odd-size nut, so industry is urged to toss its spare parts and useful unused equipment into the academic scrapbox.

The project is now under way for a trial run at Case Institute of Technology, Cleveland, where a warehouse has been set up. If all goes well, the what-do-you-want-maybe-we-have-it service will be extended to any academic lab that wants in.

The idea was conceived by H. M. Reese and H. E. Miller, whose business is preparing technical literature. They're masterminding the project, soliciting contributions of anything useful from nuts and bolts to vacuum tubes.

As a starter they called on industry for assorted sizes of hookup wire, relays, solenoids, limit switches, meters, rheostats, timers, valves, power-transmission equipment, fastening devices, control devices, electronic hardware, photographic equipment and materials, machine shop supplies and tools, visual aids, technical books, and bound periodicals.

Particularly desirable are three groups of material: 1) manufacturing rejects—equipment that can't be sold but is usable as is or with minor repairs; 2) product samples, used for display or demonstration work; 3) discarded equipment tagged for the junk pile while still useful.

Reese and Miller call their project "Operation Button Jar" because it resembles the collection into which the thrifty housewife dips to find a button to match the one that broke off in the washer. They plan to classify and catalogue their "buttons" as they enter the warehouse and channel them to participating laboratories as needed.

Anybody got an old cyclotron they'd like to throw out or give away?

World's greatest classified

opportunities

80 DIFFERENT
CLASSIFICATIONS...
P. S. SELLS TO ALL

POPULAR SCIENCE MONTHLY
355 LEXINGTON AVE.
NEW YORK 17, N. Y.

Classified Ads only \$1.15 per word insertion, payable in advance. Minimum ad 10 words. To be included in December issue, copy should be in our office by October 20. No cancellations accepted after October 15. Address orders to O. K. Kelly, Classified Adv. Mgr.

1 AUTOMOBILES & MIDGET CARS

CROSLEY or Foreign car parts catalogue. Parts discount club. Box 7, Elmont, New York.

NON-PROFIT organization offers automobile literature—old, modern, foreign; dealer books, service manuals, glossy photographs; free motor magazines. Write immediately, get on free mailing list. Auto Maniacs B. Box 451, Mt. Clemens, Mich.

2 AUTO SUPPLIES & EQUIPMENT

JEEP Parts! For Military and Civilian. At great savings. Largest inventory. Catalog for owners and dealers. Inquiries invited. American Auto Parts Co., 1830-PS Locust, Kansas City, Mo.

GREATEST Auto Parts catalog. Thousands racing and Restyling accessories for all cars. Only 25c (Refundable). Newhouse Automotive Industries, 5805PS10, Beverly, Los Angeles 22, Calif.

JUST Out! New 404-page, illustrated catalog offering savings up to 50 per cent on over 100,000 auto parts and accessories, many hard to get. All makes (1920 to 1960 models), trucks, foreign and sport cars. Also Hollywood accessories, custom styling, hi-speed equipment. Send 25c for postage, packing—refundable on first order. Whitney, 1919 PS-10 Archer, Chicago 16, Ill.

AUTO shop welding repair training in world's largest non-profit school. Low tuition. Free booklet. Hobart Welders, Box P-1001, Troy, Ohio.

"RING-Valve Job while driving." Only \$3.00 delivered. "World's only 100,000 mile (Patented) product of its kind." "Lachapelle's." "Over million new, repeat sales, fifteen successful years." Money back guarantee. Beware of imitations. Free information. Joe Dillon, National Distributor, Box 323-J, Bridgeport, Ohio.

PARTS Model "A". List 25c (Refundable) Matco, Box 135, San Pedro, Calif.

SILENCE Hydraulic Valves. \$3.00 Postpaid. Free Literature. Micro-Moly Products, Garrison 3, Kentucky.

"RING-Valve Job" while driving. \$6.00 postpaid. Guaranteed!! Nothing like it!! Lasts 100,000 miles!! Motaloy, Grantham 27, Penna.

IF you have a product or service which can be operated on a mail order basis, don't fail to read the new booklet, "How to Make Money Through Classified Advertising." Just send 10c for your copy to O.K. Kelly, Classified Adv. Mgr., Dept. 20, Popular Science, 355 Lexington Ave., New York 17, N. Y.

1909-1934 FORD Parts. Illustrated catalogue 75c. Mark Auto, Layton, New Jersey.

VOLKSWAGEN fuel gage system. \$8.95. WCEP, Box 97, Goleta, Calif.

4 MOTORCYCLES, BICYCLES AND SUPPLIES

RECONDITIONED Motorcycle Motors. Chrome accessories. Complete stock Indian parts. Expert rebuilding. Fast service. Indian Motorcycle Sales, Kansas City 27, Missouri.

USE THIS HANDY INDEX TO FIND WHAT YOU WANT

Advertising, Agencies for Advertisers...	53
Agents Wanted...	43
Antiques, Relics & Indian Goods...	29
Authors Service...	52
Auto Supplies & Equipment...	2
Automobiles & Midget Cars...	1
Aviation...	5
Boats, Outboard Motors...	11
Body-Building Courses, Jiu Jitsu, Etc...	12
Books & Magazines...	23
Business Opportunities...	37
Business Service, Information, Name Lists...	50
Buy It Wholesale...	38A
Cameras, Photo Supplies...	34
Camping Equipment & Tents...	16
Cartooning, Sign Painting, Chalk Talks...	54
Coins & Currency...	26
Color Photo Finishing...	32A
Contests...	46
Detectives...	47
Do-It-Yourself...	66
Dogs, Birds, Hamsters & Pets...	17
Earthworms, Crickets, Frogs...	18
Educational & Instruction...	45
Electric Trains...	64B
Electrical Supplies & Equipment...	7
Engineering Services...	60A
Engines, Motors, Etc...	10
Farms, Other Real Estate...	19
Field Glasses, Telescopes...	14
For Inventors...	60
For Sale Miscellaneous...	71
Formulas, Plans, Etc...	39
Government Surplus...	11A
Help Wanted Reports...	42
High-grade Salesmen...	44
Hobbies, Collections...	31
Home Craftsman...	65
Hypnotism...	24
Import-Export...	38B
Inventions Wanted...	61
Investments...	37A
Jokes, Games, Novelties, Etc...	24A
Language Outfits...	48
Loans By Mail...	80B
Machinery, Tool Supplies, Etc...	9
Magie Tricks, Puzzles, Etc...	25
Minerals & Precious Stones...	30
Miscellaneous...	79
Models, Model Supplies...	64
Moneymaking Opportunities...	38
Motion Pictures, Slides, Sound Equip...	33
Motorcycles, Bicycles & Supplies...	4
Musical Instruments and Song Writers...	35
Of Interest To Women...	70
Old Gold, Jewelry, Watches...	67
Old Stamps Wanted...	27
Personal...	80
Phonograph Records...	35A
Photo Finishing, Photocopies, Etc...	32
Plastics...	40
Printing, Multigraphing, Etc...	57
Printing Outfits, Supplies...	58
Profitable Occupations...	22
Radio, TV, Electronics, Hi-Fi...	36
Razor Blades, Shavers...	74
Remailing Service...	80A
Rubber Stamps & Office Supplies...	56
Science & Chemistry...	41
Sporting Goods, Guns, Fishing Tackle, Etc...	15
Stamp Collecting...	28
Surveying Instruments...	9B
Tattooing Supplies...	75
Tobacco & Pipes...	68
Treasure Finders & Geiger Counters...	77
Trees, Shrubs, Roots & Herbs...	20
Typewriters & Office Machines...	55
Wanted to Buy...	72
Watch Repairing...	78
Wearing Apparel...	73
Welding, Soldering...	8

AMERICAN Motorscooter \$15, Midget Car \$20, Motorbike \$35, Gyro Copter, Crosley Station Wagon \$75, Harley Servi-Car \$45, Cushman engine \$8, others \$5 up. (Mailorder only.) Send 25c (35c for First Class Mailing) for Directory-Catalogue Number 97, listing these and hundreds of other bargains in Go Carts, motorscooters, home builders parts, plans, etc. Midget Motors Directory, Athens, Ohio.

5 AVIATION

AVIATION Surplus bargain catalogue. One Dime. Box 22PS, Thomasville, Penna.

HELICOPTER — Completely engineered, assembly drawings and parts available. Send \$2.00 for photo, 3 view drawings, specifications and design information. Send additional \$2.00 for book "Basic Helicopter Aerodynamics" uses our helicopter as example problem for performance, calculations. Helicopter Research Co., Box 121, La Mirada, California.

HOMEBUILT Helicopter Handbook \$1.00. Directory \$1.00. Urshan, 4332 N.P. Station, San Diego 4, California.

7 ELECTRICAL SUPPLIES & EQUIPMENT

LAMP—Appliance Parts Wholesale. Catalogue 25c. Seco, 26 South 20th Street, Birmingham 3, Alabama.

ELECTROLUMINESCENCE: Revolutionary new area light source by Westinghouse. Wafer-thin, requires no bulbs, wires or filaments. Ideal as night, safety or dark room light. Burns night and day for less than penny a year. Sensational! Send \$1.50 for each lamp. Money-back guarantee. Approved Products, 666-B Third St., Newark, N. J.

LAMP parts. Wholesale. Thousands of items for repairing, converting. Catalog 25c. Brown Lamp, Box 305-D, Clayton 5, Missouri.

ELECTRO-Scribe! Engraves all Metals, \$2.00. Beyer Mfg., 10511-S Springfield, Chicago 55.

NEW, unusual, low-priced electrical devices. Literature 10c. Wellsco, Box 3055, North Hollywood, California.

8 WELDING, SOLDERING

WELD, solder, cut, braze, $\frac{1}{8}$ " Welder complete, \$8.95. Flame torch, \$3.95. Postage 50c. 75-Ampere transformer welder $\frac{1}{4}$ ", \$24.95 complete. F.O.B. Essay Mfg. Co., Quincy 69, Mass.

ACETYLENE Welding outfits—Arcwelders. Dealership open. Eagle Welding, Dept. 42, 5085 Broadway, Chicago 40, Ill.

WELDING Equipment & Supplies—Build or buy inexpensive 350-ampere Welder, plans 25c. Free Welder Kit catalog. LeJay Co., Minneapolis 20, Minnesota.

WELDERS, 110-220. Welds $\frac{1}{2}$ ". \$39.50. Morris, 1070 Inner Drive, Schenectady, New York.

POPULAR SCIENCE OPPORTUNITIES

FREE Catalog. welders, welder kits. Build 350-ampere welder using aircraft generator, plans 25c. Dunbar Manufacturing. Minneapolis 8, Minnesota.

AIRCRAFT Generator Carbon Brushes. All types in stock. Benjamin Sales Co., 3235 Fenkell, Detroit, Michigan.

9 MACHINERY, TOOL SUPPLIES, ETC.

METALS. Specializing in hard to find alloys, sizes. Metal Service, Sharon, Massachusetts.

FREE New Catalog showing only complete line of work holding tools available anywhere. Drill press vises, angle and swivel machine vises, rotary tables, production and heavy duty angle vises, 68 different models, fully described with prices. Palmgren Products Co., 8366 South Chicago Ave., Chicago 17, Illinois.

ACCURATE Low Cost Milling Machine—Rough Or Semi-Finished Castings Supplied—Plans \$1.00. McKins Manufacturing, 4223 Lincoln, Venice, California.

SHEET Metal Brakes 48" \$52.00, also 36", 51" Bench Shears. Free Catalog. Vyke Co., Jason, Denver 11, Colo.

9B SURVEYING INSTRUMENTS

NEW And guaranteed factory rebuilt transits and levels, sale or rent, with purchase option. We will repair, trade or buy old instruments. Write for list PS 100. Warren-Knight Co. (Manufacturers of Surveying Instruments), 136 N. 12th St., Philadelphia 7, Penna.

10 ENGINES, MOTORS, ETC.

FREE catalog. Motor re-winder's supplies, instructions, equipment plans. Modern, Box 8715, Kansas City 14, Mo.

ENGINES. Clutch. Go-Karts. Wholesale Hardware. Catalog 25c. Loren Products, Danville, Illinois.

DIESEL Injector Parts and Fuel Pumps Wanted GM51-71-110. Mayer, 7120 Carnegie, Cleveland 3, Ohio.

11 BOATS, OUTBOARD MOTORS

NEW. used, rebuilt marine motors. Marine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Coldwater, Mich.

FULL size, cut-to-shape boat patterns, blueprints. 7 1/2-38 feet. Big new 88 pg. illustrated "Build a Boat" Catalog of Naval architect-designed Catamarans, Cruisers, Runabouts, Skiffs, Outboard Boats, Sailing, Racing, Houseboats. 50c. "How to Build a Boat" Booklet, \$2.50. Cleveland Boat Blueprint Co., Dept. A-77, Box 1651, Cleveland, Ohio.

FRAME Kits, Plans or full-size Patterns for 35 Inboards and Outboards. Prepared for Amateur Builders. New 80 page illustrative catalog—50c. Glen Marine, 9152 Rosecrans, Bellflower, Calif.

FIBERGLASS Boat Covering. wholesale prices. Free literature and samples. Seifert's, Box 31X, DePere, Wisconsin.

300 BOAT Plans, Illustrated Catalogs. Powerboat \$1.00, Sailboat 25c. Trailer Kits. Marinecraft, Box 161-P, Brighton, Mass.

11A GOVERNMENT SURPLUS

JEEPS—\$223.00. Trucks—\$212.00. Tractors—\$68.00. Tools, Guns. Typical Government Surplus Prices. Buy Direct. List of Depots, Procedure, Full Details Only \$1.00. New York Enterprises, Wall Street, Box 402-S, New York 5.

BUY War Surplus Direct From the Government—Airplanes, Boats, Jeeps, Trucks, Tractors, Helicopters, Walkie-Talkies, Radar, Misc. Send for Brody's "U.S. Depot Directory & Procedures" \$1.00. Box 425-PS, Nanuet, New York.

12 BODY-BUILDING COURSES, JIU JITSU & ATHLETIC EQUIPMENT

BUILD powerful arms, chest, shoulders! 22 exercises, \$1. Fonsad, Box 601-C, 1100 Market, Wilmington 99, Delaware.

4 MUSCLE courses 25c. 12 large courses \$2.00. Big deal \$3.00. (Guaranteed) agents wanted. Sid's System, PSC4, 8421-C Evergreen, Southgate, Calif.

"BIG Muscles. The Quick Way." Dr. Young's revolutionary discovery. Free information. Gaucho, Box 9309-S6, Chicago 90.

DEADLIEST "Oriental Fighting Arts" Elemental Karate, Kung-Fu Manual. 336 illustrations. Break planks bare-handed, using breath, sand, straw, \$3.98. Satisfaction guaranteed. Adults only. Oriental Book Sales, P.O. Box 1183, Oakland 4, California.

ACT at once! Get Free five \$5 picture-packed Body Building Courses by World's Greatest Trainer. Send 10c for postage; state age. Jowett Institute, 220-A Fifth Avenue, New York 1.

TOWEL? I trimmed 50 pounds! 60 exercises. \$2. Jim Cost, Rt. 1, Eufaula, Alabama.

FREE Muscle building information. Bodytone, Box 638A, North Miami, Florida.

TRAMPOLENES—Parts: Webbing beds, springs. Mentor Sales, P. O. Box 7392, North Kansas City 16, Missouri.

BARBELLS. Dumbbells, Courses, Apparatus. Booklet 10c. Good Barbell Co., Siloam Springs, Arkansas.

PUSHED around? Don't take nonsense from bullies. Surprise them. Easy when you know Police Jiu Jitsu. Complete fully illustrated course in one volume as taught police and armed forces. Send \$1 now. Satisfaction guaranteed. Books Publishing Co., Amityville 39, New York.

14 FIELD GLASSES, TELESCOPES

WAR Surplus bargains! Millions of lenses, instruments, telescopes, binoculars, components and complete line of astronomical telescope items. World's greatest optical market place. Send only \$1.00 for beginner's 10-lens kit and big instruction booklet Stock 2-CN. Write for catalog-CN Free! Edmund Scientific Co., Barrington, New Jersey.

FREE Catalogue! Thousands war surplus optical bargains. Lenses, Prisms, Telescopes, Binoculars, etc. Send \$1.00 for 10 Lens Hobbyist Set and Project booklet. G. Jaegers, 691 West Merrick Road, Lynbrook, New York.

DYNASCOPE—Amazing world famous reflector telescope. Request free brochure. Criterion, Dept. DS-77, Hartford 1, Conn.

HAVE your own sky-power telescope with compass for only \$1.00 postpaid. Satisfaction guaranteed. Order from Southland Products, Box 41E, Lincolnton, North Carolina.

AMAZING prices precision binoculars. Folder "Binocular Selecting," catalog free. Prentiss Importers, Mercury Bldg., West Los Angeles 25, Calif.

BUILD your own Reflector Telescopes. Complete kits; Mirrors, Eyepieces, Tripods, all other accessories. Request free illustrated literature. Criterion Manufacturing, Dept. KP-70, Hartford 1, Conn.

BINOCULARS. Telescopes, Microscopes. Terrific values \$3.98 up. Request free money-saving catalog. Criterion, Dept. S-95, Hartford 1, Conn.

BARGAINS. Binoculars, telescopes, microscopes. Free catalog. Adventure Sales Company, Box 2133, San Diego 12, California.

TELESCOPES. Binoculars—all sizes. Complete telescope makers supplies. Free catalog. Suffolk Science, Mattituck, New York.

REFLECTING Telescope completely assembled. 60X. Guaranteed Observatory clearness. Free information. The Skyscope Co., P. O. Box 55, Brooklyn 28, New York.

TELESCOPE kits—direct from manufacturer. Other optical hobby kits. Large selection. Free booklet. Esco Products, Oakridge, N. J.

ASTRONOMICAL books, star-atlases, free list. Herbert Luft, 69-11 229th St., Flushing 64, N. Y.

15 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY, TRAPPING

100,000 PRODUCTS Wholesale — Free catalog! Send postcard: Econ-O-Mart, Whippany 16, New Jersey.

FREE . . . Wholesale Catalog. Beads, Spinners, Lure parts, Sinkers molds, Jigs, Reels, Funnysports, (PE), Toledo 6, Ohio.

10,000 GUNS!!! — Antiques, Moderns, Swords, Armour—every description. Giant Catalog \$1.00. Agramonte's, Yonkers 2-A, N. Y.

MOLDS for Fisherman's Sinkers, Jigs, Squids, Casting and Spinning Lures. Free Catalogue. Sweet's Molds, Tonawanda 3, New York.

5000 GUNS, Swords, War Relics. Catalog 50c. Smith Museum, Runnemede, N. J.

JAP rifles altering American shells \$6.00. Jap shells \$3.95, catalog 10c. TP Shop, West Branch 10, Michigan.

CROSSBOWS! Hunting—Bows! Factory Prices! Jayco, Box 1255, Wichita, Kansas.

16 CAMPING EQUIPMENT & TENTS

CAMPING Equipment world's largest selection. Low prices. Send 25c (print name-address) for 160 page complete catalogue of Tents, camping Equipment, national camp sites guide & camping handbook. Morsan Tents, 10-15G 50th Ave., Long Island City 1, New York.

TENTS—Premium Quality, Lightweight, German made. Free Catalog: Sportberger, Box 571-S, Minneapolis 40, Minnesota.

17 DOGS, BIRDS, HAMSTERS, RABBITS & PETS

RAISE Rabbits on \$500 month plan. Free details. White's Rabbitry, Mt. Vernon, Ohio.

FERRETS—White or brown—\$6.00 each. Alley Fur Farm, Sewal, Iowa.

GERMAN Shepherds. Registered. Large, husky pups. Reasonably priced. Onahill Kennels, New Hartford, Iowa.

18 EARTHWORMS, CRICKETS, FROGS

FREE Literature. Big money raising fishworms and crickets. We teach you how to raise and sell. Special Today! Hybrid red wigglers. 3000—\$5.95, 5000—\$8.95, 10,000—\$16.95. Postpaid, with raising and marketing instructions. Carter Farm-12, Plains, Georgia.

FREE Picture Folder, "How to Make \$3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-121, Cedar Hill, Texas.

AFRICAN Nightcrawlers — 100 — \$2.00, 500—\$7.00 (Dealers Quoted). Ozark Worm Farm-V, Willow Springs, Missouri.

19 FARMS, OTHER REAL ESTATE

CANADIAN Tax Sale Property: \$5.00 acre. Terms \$10.00 month. Fishing, Hunting, Investment, Vacationing, Timber, Minerals. Free information. Land Corporation, 3768-D Bathurst, Downsview, Ontario, Canada.

STROUT Realty Catalog—Free. 3,649 Bargains described; 35 states. Established 60 years. Strout Realty, 251-ZB Park Avenue South, New York 10, N. Y.

FLORIDA Homesites (high and dry) near National Forest \$345 at \$10 monthly. Folder free. Winfree Wernor, Deland, Florida.

POPULAR SCIENCE OPPORTUNITIES

20 TREES, SHRUBS, ROOTS, HERBS

GINSENG Bringing \$14 Pound. Have seeds, plants. Goldenseal. Full information. G. Collins, Viola, Iowa.

22 PROFITABLE OCCUPATIONS

INVESTIGATE Accidents—Earn \$750 to \$1,000 monthly. Thousands of airlines, insurance companies, steamship lines urgently need Accident Investigators. Make excellent full time or spare time income. Free book! No obligation. G. I. Approved. Write: Universal Schools, CPS-10, Box 8227, Dallas 5, Texas.

FREE Picture Folder, "How to Make \$3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-7, Cedar Hill, Texas.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-10, Plains, Ga.

VENDING Machines—No Selling. Operate A Route of Coin Machines and Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 17, 715 Ensor Street, Baltimore 2, Maryland.

MAKE Money Writing Short Paragraphs. Information Free. Barrett, Dept. C-86-B-X, 7464 No. Clark, Chicago 26.

BECOME independent with your own franchise business. Thousands earning handsome incomes. Request interesting facts today. National Franchise Reports, PS-528, 333 North Michigan, Chicago 1.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth 5M, Brooklyn 4, New York.

PIANO Tuning—Home Study Course. Diploma granted. American School of Tuning, Box 707, Gilroy, Calif.

IF you have a product or service which can be operated on a mail order basis, don't fail to read the new booklet, "How to Make Money Through Classified Advertising." Just send 10c for your copy to O.K. Kelly, Classified Adv. Mgr., Dept. 220, Popular Science, 355 Lexington Ave., New York 17, N. Y.

WANT to make \$5,000.00 yearly or more in respectable, easily learned Mailorder Business? Send 25c for complete Plan. Details! Columbia, 45-09-PP Broadway, Long Island City 3, New York.

23 BOOKS & MAGAZINES

GOOD Used Books, 50c-\$1. Free Lists. Editions, Dept. PS, Hempstead, New York.

BRITISH Book Bargains. Any subjects. Catalogues free. Transbooks, Wantagh 77, New York.

SCIENCE-Fiction Book Bargains. List Free. Werewolf Bookshop, Verona, Pa.

ATHEIST Books. Catalogue free. Truth Seeker Co., 38 Park Row, New York 8.

BOOKHUNTERS: All Subjects. Send Wants! Jaher Book Service, 183 Hazelwood Drive, Westbury, New York.

NATIONAL Geographic Magazines, Any issue, 1888-1960. Periodical Service, Box 465-PS, Wilmington, Delaware.

SAVE 20% to 80% On Books. Free Catalog. Discount Reader's Service, SJ-5435 Upland Way, Philadelphia 31.

100,000 BOOKS—10c Each! Astonishing Subjects! Tons Titles! Free Catalogs. "Bargains", 1323-MS Chaparral, Corpus Christi, Texas.

MAGAZINES Wholesale-Retail catalogue 10c. Backdates, 1181 East Lombard, Baltimore 2, Maryland.

"ELIXIR of Life." Clothbound. Reveals life giving elixir. \$2.00 postpaid. Faith Farm, Cooks Falls, N. Y.

JUST Out! Amazing new booklet, "How to Make Money Through Classified Advertising." This booklet is "must" reading for all mail order men. It tells you what, where, when and how to advertise. Contains scores of valuable hints on keying ads, writing copy, analyzing results, etc. If you advertise now, or ever plan to, don't fail to read this booklet. For your copy, just send 10c to cover postage and handling to O.K. Kelly, Classified Adv. Mgr., Dept. 230, Popular Science Monthly, 355 Lexington Ave., New York 17, N. Y.

AMAZING books! All subjects! Free Catalog! Tyndall's Service, Fountain, N. C.

UNUSUAL—Extraordinary Books 10c Each! Every Subject! Catalogs Free! Mailway, Box 124-PS, Stuyvesant Station, New York City 9.

24 HYPNOTISM

HYPNOTIZE Self, Others while asleep with amazing hypnotic phonograph records, tapes. Catalog free. Research Association, Box 24-G, Olympia, Washington.

FREE Illustrated Hypnotism. Selfhypnosis Catalogue. Write: Hypnotist, 8721 Sunset, Hollywood 46P, California.

FREE Catalog! Hypnotism, Autohypnosis! Books, Tapes, Records! Drawer PS697, Ruidoso, New Mexico.

HYPNOTISM. Selfhypnosis. Guaranteed home study courses. Diploma issued. Free brochure. School Hypnology, 135C Central Park West, New York 23, N. Y.

INVENTION, plastic Hypno-Coin has whirling hypnotic lens. Complete with secrets, instructions, only 99c. Success or Money Back. Free catalog—records, books, machines, enclosed. Hypnotic-Aids, 10-PS, 1133 Broadway, New York City 10.

STARTLING new (1959-60) principles for secretly producing hypnosis. Satisfaction guaranteed. \$2. Intern, Box 244, Cedarburg, Wisconsin.

"HYPNOTIZE . . . One word . . . One fingersnap." on stage. Satisfaction—or refund. \$2. Hypnomaster, Box 9309-S6, Chicago 90.

"HYPNOTISM Explained." 64 page book—15c. Bookmaster, 1843 Harte, San Jose 3, California.

PROVEN new concept of self-hypnosis teaches you quickly, easily! New book! New tape! New record! Free literature. McKinley Publishers, Dept. SP, Box 3038, San Bernardino, Calif.

WORLD'S largest catalog free. Merlin Enterprises, 1344 Lincoln Avenue, San Jose, California.

LEARN While Asleep (Method 92% Effective). Develop A Powerful Personality. Control Weight And Tension With Electronically Proven Transitional Sleep Methods. Details Free. A.S.R. Foundation, Box 21-Z, Henry Clay Station, Lexington, Kentucky.

"TEENAGE Hypnotist" \$1.00. Jack Pisette, 6334 North Glenn, Fresno, California.

24A JOKES, GAMES, NOVELTIES, ETC.

3100 NOVELTIES, Jokes, tricks, gadgets, funmakers, hobbies. Big catalog 10c. Johnson-Smith, D-495, Detroit 7.

FUN Gifts and Jokes galore. Catalog 10c. Greenland Studios, Miami 47, Florida.

GO Ventriloquist, all secrets told. Make money, surprise friends, have fun. Send fifty cents for catalogue, of dummies, dialogues, etc. Gough, 203 East Kickapoo, Hartford City, Ind.

25 MAGIC TRICKS, PUZZLES, ETC.

WORLD'S finest professional magic Joker novelties. Giant illustrated catalog 10c. Top Hat, Evanston 13, Illinois.

WIN. Dice, Cards. Catalog 10c. Book, Box 671, St. Louis 1, Missouri.

500 TRICKS. Famous Douglas 120-page catalog number 33 now available. Complete catalog—magic tricks—equipment just 10c. World's fastest service. Magicland, Dept. 24, Box 274, Dallas, Texas.

WORLD'S greatest Tricks, Jokes, Professional Magic! Latest 1960 Catalog now ready! 160 Pages! 1000 exciting items! 700 Illustrations! Rush 25c (Refunded with first \$5.00 order) House of 1000 Mysteries, Dept. PS10C, Trumbull, Conn.

CARD Players—Learn old Soldiers Card Trick Fantastic. Entertaining. Correct. Read Bible Sermon from Cards. Printed Sermon 50c. Benke, 4661 Somerset, Detroit 24, Mich.

FREE Trick and Magic Catalog 25c. Castle Magic, Box 92-PS, Jamaica 35, New York.

3000 TRICKS, pocket, parlor, stage. World's Finest Magic Catalog (408 pages). \$2.50. Kanter's, S-1311 Walnut, Philadelphia 7.

FREE—Big amusement catalog free. Tricks, stage goods, Houdini handcuff escapes. I teach you. Heaney the Magician, Inc., Oshkosh, Wisconsin.

26 COINS & CURRENCY

WHETHER your coin is worth \$10.00 or \$50,000.00, we'll pay the highest prices of any dealer advertising a Buying Catalogue. We have checked every advertised Guaranteed Buying Catalogue. We have been leaders of Numismatic Quotations for over twenty years, have paid out Thousands of Dollars for Rare Coins, dated before 1943. Our catalogue is used by practically every coin dealer as a Buying and Selling guide. Know their true value. Send \$1.00 for large Illustrated Complete Guaranteed Buying-Selling Catalogue of United States Coins, paper money, Foreign Coins, etc. Catalogue dollar refundable on \$20.00 sale. Worthycoin Corporation (K-308-C), Boston 8, Massachusetts.

NUMISMATIC'S Largest Newspaper. Semi-Monthly. Sample 25c. \$2.00 Yearly. Numismatic News, Washington Street, Iola, Wisconsin.

GET Profit And Pleasure in collecting old coins. Send 25c for 68-page illustrated coin catalog. You'll be delighted with it. Send for it now. B. Max Mehl, Box 750-C, Costa Mesa, Calif. Oldest rare coin establishment in U.S. Established 50 years.

FREE List! U.S. Coins. Lowest Prices. Hugh's Coins, Hickory, North Carolina.

OLD Money Wanted. Will pay \$1,000.00 for 1894 Dime, S. Mint. \$5,000.00 for 1913 Liberty head nickel (not Buffalo). Big premiums paid for all rare coins. Send 5c for Large Coin Folder. May mean much profit to you. Numismatic Co., Box 750-R, Costa Mesa, California.

COINS from Formosa, Vatican plus foreign banknote, 10c with coin approvals. Littleton Coin Company, Littleton S2, New Hampshire.

INDIAN Cent, Foreign Coin, Plus Bargain Lists 10c. Hutchinson's, Box 4747, Phila 34, Penna.

COINS Wanted. List of prices paid 25c. Wayne Coin, 1205 California Ave., Ft. Wayne, Indiana.

LARGE price list of U.S. Canadian, Foreign, Coins, Notes and Collectors Supplies. 25c. Canada Coin Exchange, 80 Richmond St., Toronto 1, Canada.

VALUABLE Coin Premium Catalog \$1.75. Cash Waiting For Your Coins. Montrose Coin Gallery, P.O. Box 245, Montrose, California.

WHAT are your coins worth? Amazing Fell's new 1960 U.S. Coin Book by Jacques Del-Monte. Everything on every single coin minted—worth, value, how to sell, speculating, investment; other valuable facts. Clothbound, 150 illustrations. Send no money. Pay postman \$2.00 (plus postage) or \$2.00 postpaid (refundable). Fell Publishers, 386-CP, Fourth Ave., New York 16.

FREE Bonus Offer! U.S. Bargain List, 10c (refundable). Economy Sales Company, Mansfield, Massachusetts.

JAPAN, Switzerland, Austria, Finland's coins All 10c. Jolie, Roslyn Heights, New York.

INDIANHEAD Cents 15 Different \$2.00. DeWolf, 213 So. Tremont, Oceanside, California.

RAREST CC Mint Dollar, 1885 Unc. \$10.00. 100 Pg. Illustrated Catalogue 50c. Shultz, Salt Lake City 10, Utah.

SIX Different Indian Cents \$1.00; Free Discount List. Collector's Bargains, Box 66A, New Hope, Penna.

POPULAR SCIENCE OPPORTUNITIES

COIN Magazine, 200 pages. Sample 50c. Numismatic, 7320 Milwaukee, Chicago 31.

BEAUTIFUL Uncirculated sets (In albums)—Jefferson Nickels—\$107.50; Roosevelt Dimes—\$43.75; Franklin \$—\$69.00. Brilliant Proof sets: 1956—\$8.45, 1957—\$5.95, 1959—\$5.95, 1960—\$5.95. Queen Elizabeth Coronation—\$11.95; Ghana—\$9.95. Official Alaska, Hawaii, Santa Fe medals, each \$4.15. Bebee's, 4514 North 30th, Omaha 11, Nebraska.

SIXTEEN page 1960 retail price list of U.S.A. and Canadian coins for 10c. Our selling prices on thousands of coins and coin collectors supplies. Bryson Incorporated, 612B White, Toledo 5, Ohio.

LINCOLNS 25c each: 1909-VDB, 1915, 1915-D, 1916-S, 1921-S, 1924-S, 1931, 1932-D, 1929-D. 50c each: 1911-D, 1912-D, 1913-D, 1926-S, 1933-D. Wholesale list 15c. Al. Johnson, Box 35, Colorado Springs, Colo.

NEED more customers for your coin business? Write me for information on low-cost, business-producing classified ads in Popular Science. Join the many other coin dealers whose ads you see here and who make more money through Popular Science Classified Advertising. Address O.K. Kelly, Classified Adv. Mgr., Dept. 260, Popular Science, 355 Lexington Ave., New York 17, N. Y.

U.S. coin list 10c Contains over 100 illustrations; over 5,000 delightful bargains. Stoney, 260 Washington, Boston 8, Mass.

IF you want profits too, Get this Illustrated Coin Guide Now. \$1.00. Richer, Box 9018, Schenectady 1, N. Y.

WE buy all rare American coins. Complete catalogue 50c. Fairview, Box 1116-YI, New York City 8.

LIBERTY Nickels 6 different \$1.00. Price List 10c. R&M Coins, Delanco, New Jersey.

TOP Prices Paid for old U.S. coins and collections. Leonard's, 5870 Overbrook Ave., Phila. 31, Pa.

25 DIFFERENT coins. 25 different countries. \$1.00 Bargain. Hindley, Box 808, Mt. Vernon, Ohio.

LINCOLN cents: 1923-S, 1921-S, 1924-S, 1916-S-D, 1927-S-D, 1928-S-D, 1920-S-D, 1909-P, 1925-S-D, 1938-S-D, 1930-S-D, 1955-S, 1917-S-D, 1918-S-D, 1919-S-D, 1920-S-D, 1934-D, 1931-P. Good to fine complete lot \$3.95. Berry, Box 306, Westminster, Calif.

27 OLD STAMPS WANTED

IMMEDIATE Cash for Old Letters, Stamps, Coins. Send to Brooks Stamp Company, 2323-I Avenue X, Brooklyn 35, New York.

28 STAMP COLLECTING

80 DIFFERENT U.S. Stamps. Includes 19th Century Commemoratives. High Values. Plus 1943 Flag Stamp of occupied Nations. All for only 25c. Approvals included. Willett Co., Box 338-Y, Yorktown Heights, N. Y.

UNITED States commemorative collection containing 33 different—10c. Approvals. White, 516-W Avenue L, Brooklyn 30, New York.

307 WORLDWIDE different stamps only 25c. Approvals. Niagastamp, St. Catharines 672, Ontario.

25 DIFFERENT large American Commemoratives 10c. With approvals. Linstamp, St. Catharines 619-A, Ontario.

AMAZING Offer! 200 U.S. stamps—including commemoratives, airmails, high denominations to \$1.00—only 10c to Approval Applicants!! Illustrated Bargain Lists free. Mystic Stamp Co., Dept. 55, Camden, New York.

103 DIVERSIFIED British Colony Stamps only 10c. Approvals. Niagastamp, St. Catharines 672-A, Ontario.

102 DIVERSIFIED Worldwide stamps 10c. Approvals. Linstamp, St. Catharines 619, Ontario.

1000 DIFFERENT Worldwide Stamps \$1.00. Valued over \$20.00. Universal, Box 6, Kenosha 6, Wisconsin.

INTERESTING Worldwide Animal stamp collection 10c. With approvals. Niagastamp, St. Catharines 672-B, Ontario.

WORLDWIDE, 50 all different, absolutely free, just to introduce our incomparable approvals. Kent Stamp Company, GPO Box 87, Brooklyn, New York.

100 DIFFERENT Stamps, 10c with approvals. Smith, 508U Brooks, College Station, Texas.

TWO \$5.00 United States Stamps, twenty others 10c with United States approvals. Irwin, Box 1109, Brooklyn 30.

FREE! \$1.00 worth, your choice, from first selection. No Strings! Adults Only. Rush request now. Philatelics, Dept. TF, New Paltz, New York.

508 DIFFERENT World-wide from Formosa, Morocco, Indonesia, etc., cataloging over \$15.00, only 35c. Offer to Adults Only. Approvals. Littleton Stamp Company, Littleton Q2, New Hampshire.

NUDES set (4)—Unusual Approvals 10c. Atlas, Eisenhower, Racine, Wisconsin.

ALBUM! Hundreds of Spaces! Only 10c. Postpaid! Stampmart, Hartford 1, Connecticut.

225 STAMPS For only 10c! This mammoth value includes Airmails, Pictorials; stamps from strange Countries cataloging up to 25c each! Also Approvals. Mystic Stamp Company, Camden 55, N. Y.

WOW! 110 All Different Germany 10c Zeppelins, Semi-Postals, Airmails, High values, etc. Giant Catalog, bargain lists included with beautiful approvals. Jamestown Stamp, Dept. A100PS, Jamestown, N. Y.

EXCEPTIONAL 125 different, cataloging \$3.00, includes triangles, commemoratives, 10c, approvals. Reeves, Box 37597P, Miami 37, Florida.

FREE! Giant Bargain Catalog — New Edition listing thousands of bargains including U.S. and B.N.A. Stamps, packets, mixtures, albums, accessories and supplies; sent with beautiful approvals. Jamestown Stamps, Dept. E100PS, Jamestown, N. Y.

FREE 60 Different stamps to collectors requesting approvals. Stanley Zajac, 159 Emerson Ave., Toronto, Canada.

FOREIGN F.D.C.'s mailed direct! 20 years experience. Contacts in every quarter of the world. Brunsey, 2418 First, Ft. Myers, Fla.

500 WORLDWIDE for 25c! Contains U.S.A., Russia, First U.N., Summit Conference, Olympics, Space Satellite,—hundreds more! Approvals, illustrated offers included. Horace Gatewood, Winston-Salem, North Carolina.

FREE 400 genuine postage stamps! Worth \$10.00 at catalogue prices. Africa—Europe—Asia—British Emp.—a fascinating, valuable mixture from foreign convents, banks, etc. Who knows what you will find. Also Free helpful Collectors Handbook. Adults only. Approvals enclosed. Frasek Co., PS, White Plains, New York.

DEALERS Wholesale Catalog. Postage 4c. Franksco, 5031 Queensbury, Baltimore 15, Maryland.

WILL Rogers Air! Helicopter Triangle!! Plus Monte Carlo Dove Triangle! Stamp printed in Solid Gold! New York Empire State Bldg. airmail, lovely Congo Orchids in full colors, etc. 10c with approvals. Sunny Stamps, Apopka 10A, Florida.

YEMEN Flag Stamps with Saudi Arabia and Iraq Flags. Also Hospital Stamp. Big multi-colored, unused, scarce stamps. Catalog \$1.80, 10c with approvals. Ozark Stamps, Spring Lake 10A, Michigan.

50 DIFFERENT Scandinavian 12c in stamps. Kimber, Pack, Hagersten 6, Sweden.

TERRIFIC Stamp Bargain! Israel—Iceland—Vatican Assortment—plus exotic triangle set—Also fabulous British Colonial Accumulation—Plus large stamp book—all four offers free—Send 10c to cover postage. Empire Stamp Corp., Dept. PR, Toronto, Canada.

VATICAN Coronation Souvenir—pope John XXIII card and 10 attractive stamps in protective plastic folder. Story of Vatican and coronation on reverse. A beautiful addition to any collection, 25c with approvals. Capital Stamp Co., Ferrysburg 10B, Mich.

FREE! 25 Egypt 5c handling. Approvals. Bellet Stamps, Hazel Park, Michigan.

UNITED States, Canada, British Colonies' Quality Approvals. Enclose 10c. Peterson, Box 31, St. Paul 2, Minnesota.

PORTUGUESE! 40 Different Free. Approvals. Elkhart, Box 33, Elkhart, Indiana.

200 DIFFERENT Worldwide only 10c. Approvals. Munson Stamps, Gales Ferry, Connecticut.

FREE! Any volume Scott's International Albums, Scott's 1961 catalogues—even Master Global Album Free, when you buy our sensational foreign approvals. Topval Stamps, Redlands 3, Calif.

MINT U.S.! Famous Americans complete \$6.75. Approvals. Teall's, 661 Beach, Rochester 12, New York.

FREE!—Albums—Catalogues—Philatelic Gifts to purchasers from our approval selections. Thousands. Bargains for pennies. Write today. Stamps, Box 312, Orange, California.

WONDERLAND Collection—Gorilla, Rhino, Buffalo, Antelopes, lovely Olympics Triangle, 100 others all different, only 10c with approvals. McHenry, 662 Blaine, Akron 10, Ohio.

INDIA!—100 Different, 25c! Bargain approvals! Carling's, D-100, Howard City, Michigan.

ONE Hundred stamps for 10 cents if you request approvals. I.J. Stamps, Box 644, Bloomington, Ill.

10 YEAR'S Offer! Always Available: Amazing Bargain Lot, Hundreds Stamps, Packets, Sets \$1. Giant Assortment \$5. High Value Packet \$3. Persile, 436 N. Y. Ave., Brooklyn 25, N. Y.

FIRST U.N. Set. Among World's Prettiest. Only 10c. Approvals. Welles, Box 1246-X, New York City 8.

FREE Sample! Interesting. Informative. Illustrated. National Stamp News, Anderson, South Carolina.

BEAUTIFUL Topical Approvals Two, Three, Five Cents Each. Large Selections. Postage Paid. Circle Stamps, Box 112, Stoneham 80, Mass.

100 DIFFERENT U.S. stamps 35c with approvals. Chartier, George St., North Haven, Conn.

U.S. Mint Flag set, complete, \$1.00. Free list. Brooks, 2323-T Avenue X, Brooklyn 35, New York.

NEW Stamp Magazine, Sample 25c. Philatelist, P. O. Box 8382, Albuquerque, New Mexico.

PREMIUMS Given! Penny Approval Purchases. Ross's, Box 341, Yonkers, New York.

COLORFUL!—21 beautiful wildlife, flowers, sports, in sets—10c handling—plus free albums with purchases. Student Stamp Company, Box 116S, Claremont, New Hampshire.

DEFECTIVE Old U.S., 1/6 Catalog. Adults. G. Swartz, Malden Bridge, N. Y.

200 DIFFERENT 10c with approvals. Idle Hour Stampco, Greeley, Colorado.

ILLUSTRATED U.S. Catalogue 20c. Refundable. Philpot; 1902 Losey, La Crosse, Wisconsin.

1000 DIFFERENT \$1.00 with approvals. Goldens, 6721 Eastwood, Philadelphia 49, Penna.

POPULAR SCIENCE OPPORTUNITIES

100 OLD U.S. Stamps between 1861 and 1935 \$1.00. Rousch Stamps, 51 Chestnut, Mansfield, Ohio.

PENNY Approvals jammed with Bargains. For better values, try Putnam Stamp Company, Mahopac, New York.

1076 DIFFERENT \$1.00 with approvals. Klondike, 682 Jefferson, Elgin, Illinois.

222 DIFFERENT worldwide plus 66 different U.S. 25c. Approvals. Casto, Box 357, Dunbar, West Virginia.

109 DIFFERENT worldwide stamps 10c. Approvals. Newman, Box 176, Penticton 10, B.C., Canada.

FREE! Afganistan, Bahawalpur, Negrisembilian, Tanganyika, Thailand. Inexpensive approvals accompany. Nade's, 116 Thomas, Wilmington 6, Delaware.

ANTARCTIC Territory, others—Free! Request approvals. Dancer, B75-T12, Mansfield, Ohio.

FREE—Mint British Colonies from Brunei, Solomon Islands, Negri Sembilan, Sarawak, St. Christopher, Nevis, Trengganu, Gilbert Ellice. Free with approvals. Viking, Great Neck 5, New York.

25 DIFFERENT Commemoratives 1893 up 10c. U. S. Approvals. K & B, Box 70, Brooklyn 23, N. Y.

NEED more customers for your stamp business? Write me for information on low-cost, business-producing classified ads in Popular Science. Your ad here reaches interested stamp buyers everywhere. Next issue will be December (closing date October 20). Address O.K. Kelly, Dept. 280, Popular Science, 355 Lexington Avenue, New York 17, N. Y.

MYSTERY Bag Stamp Collection, Only 10c. Hill Company, Box 51, Defiance, Ohio.

GERMANY. Mint set sixteen. Only 10c to introduce my approval service. John Schuster, 301 Sandpiper, Playa Del Ray, California.

PENNY Approvals! Regardless Catalogue! Kloster, 4164—52nd Ct., San Diego 5, California.

14,000 DIFFERENT! Amazing new plan builds your collection systematically, country by country. Only 50c weekly. Free details. L. G. Ware, Stepney 70, Conn.

FREE! Surprise packet with approvals. Chamberlain, Box 113, Hesperia, California.

10 BEAUTIFUL Mint British Colonies 10c with approvals. Bennett, Candor 2, N. Y.

OLD scarce U. S. seconds on approval. Slightly defective, bargain prices. Hearnfeld, Clintonhill Station, Newark 8, N. J.

105 BRITISH Colony Stamps, all different, 10c. Approvals. Crown Stamp Company, 902, Virgil, Ontario.

U.S. Bargain 53 different 10c, with U.S. Approvals. Stamps, Kennebunk, Maine.

JAMAICA: Royal Visit, Mint, only 10c. Approvals. Rheame, 6591 11th Ave., Montreal, Canada.

21 "ROUND The World" Animals On Stamps. Two Dimes. Approvals. Stamp Farm, S1-27, Oxford, Wisc.

FREE!! Beautiful stamps Gold, Silver, 26 others. Approvals. Delor, 20226 Westphalia, Detroit 5, Michigan.

TEN Complete sets 10c, with attractive Approvals. Stamp Imports, Peterboro, Canada.

BULLFIGHTERS and five Complete sets. 10c with interesting approvals. Kawartha Stamps, Box 513, Peterboro, Canada.

HUNDREDS of stamps on paper. Unpicked from Missions all over the world. With approvals. Quarter pound \$1.00, trial lot 25c. Laurentian, 5600 Beurling, Verdun, Quebec.

WORLDWIDE Collection—311 different including triangles, diamonds, commemoratives, bi-colors, multi-colors. Airmails—25c. Approvals. Valley's, Box 414S, Spring Valley, California.

STRANGE lands. Polynesian hula girls, Zanzibar sultans, Israel, Greenland, Transjordan, etc. 10c with approvals. Pioneer, Box 11, Ann Arbor, Michigan.

1000 DIFFERENT Worldwide. \$1.00. With approvals only. Jacobsen, Crompond, New York.

FABULOUS Germany Set Collection: Giant Ship set, Moonrocket giant, Sports & Flowers sets, High Mark value cpl. sets, scarce Se-tenant, ancient art treasures, concentration camp, error, sport races Plus dozens of other topical issues. This entire collection together with a 48-Page Stamp Dictionary is yours for only 25c! Bargain approval offers included. Stampex Co., Box 47-BP, White Plains, N. Y.

1,000 MIXED Stamps—25c With Approvals. Wm. Rice, 87 Washington Ave., Kingston 65, N. Y.

500 FINE mixed U.S. 15c. Wright, 201-P Mealey, Hagerstown, Maryland.

29 ANTIQUES, RELICS & INDIAN GOODS

AFRICAN Primitive Genuine Hand-carved Figures Sent To You Direct Or To Your Friends. Selection Of 6 Wild Animals And 1 Ebony Warrior \$10.00. Or 1-12 inch Warrior With Spear And Shield \$3. Money With Order. Packing And Postage Free. "African Treasures", P. O. Box 28, Mombasa, Kenya.

SELLING 100,000 ancient Arrowheads, Spearheads, Tomahawks, etc. List free. Lear's, Glenwood, Arkansas.

10 ANCIENT arrowheads \$2.00. List 10c. Redick, 1061 Geers, Columbus 6, Ohio.

30 MINERALS & PRECIOUS STONES

EARTH Science — Rockhounds National Magazine. Subscription \$2.50. Sample 35c. Box 1357-PS, Chicago (90), Ill.

GET Free Catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or Craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free . . . new catalog just off the press —yours for the asking! Write Grieger's, Dept. C-14, 1633 E. Walnut, Pasadena, California.

LAVA Shiny Black; Puna Eruption. Rare, Unique. Supply \$1.00. Box 8488, Waikiki, Hawaii.

GOLD, Silver, Copper Ore With Catalog 50c Postpaid. Gemco, Eisner Avenue, Sheboygan, Wisc.

BEAUTIFUL Australian Fire Opal \$2.00 oz. up. Cut \$2.50 each. List. "Opals Exclusively," 20385 Stanton, Castro Valley, California.

FREE bargain gem list. Lapidary and silversmith catalog, 56 pages, 25c. O'Brien's, 1116 N. Wilcox, Hollywood 38, Calif.

PROSPECTORS! Learn from experienced geologists how to locate and identify rocks and minerals. A comprehensive home study course designed for anyone interested in exploring for valuable ore deposits. Write now for Free Literature. Pacific School of Mines, Dept. A10, Box 2538, Palm Springs, California.

31 HOBBIES, COLLECTIONS

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 635-F St., N.W., Washington 4, D. C.

COLLECT Medals, American, French, German: Three different regulation size; Send \$2.00, get five foreign Emblems free. Catalog 25c. Insignia Club, 550-A Fifth Ave., N. Y.

COLLECTORS Matchbook covers. 100 Different unused \$1.00. Catalog 25c. Album \$3.00. Charles Edelman, 1311-P East 84, Cleveland 3, Ohio.

SOLDIERS—Over 1,000 sets. Including, Civil War, Romans, Knights, Napoleonic. Catalog #2—35c. Bussler, Box 107-E, Wolaston 70, Mass.

WANTED — Cigarette, tobacco cards. Write Charles Bray, East Bangor, Pennsylvania.

BEAUTIFUL Brazilian Folklore Color-prints, 12 assorted, US\$1.00 cash. "Mailor." C. P. 4371, São Paulo, Brazil.

32 PHOTO FINISHING, PHOTOCOPIES, ETC.

TWELVE Exposure rolls 49c. Wallets 20 for \$1.00. Lincoln Studios, Dept. L, Box 13, Lincoln, Nebr.

A Triple Value—Quality, Price, Service, Color or Black & White. 12 exp. (Black & White)—59c. 20 Gift Photos—\$1.00. Holiday Photos, Dept. 17, Box 666, Denver, Colo.

A 3-in-1 Value—Price, Quality, Service. 20 Gift Photos—\$1.00. 12 exposure rolls (Black & White)—59c. Color or Black & White. Interstate Photos, Dept. 12, Box 15, Aurora, Ill.

INTRODUCTORY Special. Processing Kodachrome 8mm movie or 35mm 20 exp. \$1.00. Kodacolor 8 exp. complete \$2.00; 12 exp. \$3.00. Black and white 8 jumbos 40c. Jumbo reprints 5c. Quality guaranteed. Prompt service. Write for free mailers. Fast-X-Foto, Dept. PS-10, Box 7A, Jersey City, N. J.

SAVE On Photo Service. Kodacolor 8 Exposure Roll—\$2.50, 12 Exposures—\$3.50. Reprints 25c. Black and White 8—50c. 12—70c. Reprints—5c. Fast Kodachrome, Ektachrome and Anscochrome Processing. Free Mailers and Price List. Save on Photo Service, Box 50, Watertown, Wisconsin.

GLOBE Saves You More!—Color, black and white prints developed in new modern plant licensed by Kodak. Finest Quality—Fast Service Guaranteed. 12 Exposure Black and White developed Jumbo prints, 60c—12 Exposure Kodacolor developed and printed, \$3.75. Write for Free price list and mailer. Worldwide Service, Globe Photo Company, Dept. C, Box 3508, St. Paul 1, Minnesota.

ENLARGEMENTS! Eight 5x7's or Five 8x10's from negatives, \$1.00. Wilart, Box 975, Little Rock, Ark.

ROLLS developed and printed fifty cents. Fast service. Merritt Studios, Oakland, Mississippi.

32A COLOR PHOTO FINISHING

KODACHROME-Ektachrome Guaranteed Kodak Processing—Prompt—8mm or 35mm 20 exp. \$1.40. Free List-Mailers Color Pix, Dept. S, CPO Box 30, Kingston, N. Y.

33 MOTION PICTURES, SLIDES, SOUND EQUIPMENT

MOVIE Camera Film 8 mm roll \$1.50. 16mm 100' \$3.00. Free processing. Better Films, 742 New Lots, Brooklyn, N. Y.

MOVIE Film! Free catalog! Eso-H, 47th Holly, Kansas City 12, Mo.

TAPE recorders, Hi-Fi components. Sleep Learning Equipment, tapes. Unusual values. Free Catalog. Dressner, 69-02 174 Street, Flushing 65, New York.

POPULAR SCIENCE OPPORTUNITIES

FREE every month—Blackhawk's newspaper-size catalog 8mm, 16mm movies, 2"x2" color slides. Biggest selection in USA. Bargains in used 16mm sound films, projectors. Blackhawk Films, Davenport 15, Iowa.

HI-FI Components. Recorders. Free Wholesale Catalogue. Carston, 125-J East 88, N.Y.C. 28.

FREE Catalogues. 5,000 8-16MM Films. International Films, Greenvale, New York.

8MM-16MM Color And B&W film and supplies. Save \$\$\$! Free Catalog. Superior, 442-448 N. Wells, Chicago 10.

SEE the World in Color. 8mm—16mm. Kodachrome movies. Alaska, Hawaii, America, Europe, Africa, South Seas, U.S. National Parks. Also War and Rocket Test films. 185 subjects. Low prices. Write World in Color, Box 392-PS, Elmira, N. Y.

MOVIE Fans—8x10 Black-White photographs from old-new movies. Old 50c, New 25c. Bruco, 115 E. 157th, New York 51.

16MM Sound shorts. Tremendous assortment of features. \$16.50 up. Used 16MM sound projectors, \$79.50 up. Free Catalog. Abbe Films, 417 West 44th Street, New York 36, Plaza 7-2219.

SPECIAL Entertainment—8mm b&w, 50 feet \$12.00. 16mm b&w 100 feet \$20.00. Pareé, Box 368, Terminal A, Toronto, Canada.

8MM-16MM. U.S. National Parks in Kodachrome. Over 150 other wonderful subjects! Free Catalog! Griffin, 322-PS West State, Ithaca, New York.

34 CAMERAS, PHOTO SUPPLIES

PHOTOGRAPHIC equipment. Free wholesale catalog. RNG Sales, PS, Wildomar, California.

164 PAGE Photographic Bargain Catalog, listing thousands of photographic bargains. Send 25c for your copy, credited on first order. Dept. 4-C10, Central Camera Company, 230 So. Wabash Ave., Chicago 4, Illinois.

DISCOUNT cameras bulletin free. Warbucks, 799 Broadway, New York City 3, N. Y.

35 MUSICAL INSTRUMENTS AND SONG WRITERS

SONGPOEMS and lyrics wanted. Mail to: TinPan Alley, Inc., 1650 Broadway, New York 19, N. Y.

SONGWRITERS: Recording Company Wants new songs. Royalty basis. National sales, promotion if selected. No charge for melodies. Send material. Music Makers, Dept. G-64, 8344 Melrose, Hollywood, California.

SONGWRITERS! Protect your ideas! Hold all poems, songs! Write for safe, correct procedure! Song Service, Dept. PS, 333 W. 56th, New York 19.

POEMS Wanted for musical setting and recording. Send poems. Free examination. Crown Music Company, 49-P West 32 Street, New York 1.

POEMS Needed Immediately for New Songs and Records. Free Examination and Appraisal. Send Poems: Songcrafters, Acklen Station, Nashville, Tenn.

SONGWRITERS, with publisher contacts, want song ideas. Share royalties. No fees. Send poems: Songwriters' Associates, 1650 Broadway, New York 19-P.

CHORD Organs—Save 1/2. Italian Craftsmanship. Play without lessons! Terms. Free Trial! Free Catalogs. Philharmonic Importers, Department P, 2003 Chicago, Chicago 22.

POEMS Wanted! Best songs recorded Free with 7-piece orchestra. Melodies written. Send poems, free examination. Songmakers, 1472-S Broadway, New York 36.

GUITAR Making, books, plans, imported woods, tools. List 10c. Wildwood, 510 East 11th Street, New York 9, N. Y.

WE Repair and overhaul band instruments. All woodwinds and brass. "Expert repairs at reasonable prices." New England Musical Instrument Repair Service, 125 Maple St., Greenfield, Massachusetts.

ACCORDIONS—Organs, buy direct from importer. Big savings. 5 day trial. Free color catalog. Dept. PS 10. Accordion Import Center, 7120 Galli Drive, San Jose, Calif.

POEMS Wanted for musical setting and recording by America's Largest Song Studio. Send poems. Free examination. Five Star Music Masters, 6 Beacon St., Boston.

ACCORDIONS! Direct from Importer—savings to 50%. Free home trial. Trades accepted. Easiest terms. Famous makes. Free 1961 catalog. Accordion Corporation, Dept. P, 2003 Chicago, Chicago 22.

PROFESSIONAL copy of your song, 50c. Free Music for your Poems. Capitol City Studios, 827 Laurens, Columbia, S. C.

SONGS Into \$\$\$\$—Share \$33 million dollars yearly for New Songwriters. Song-poets. Any subject, songs composed, published, promoted by largest firm. Information, appraisals Free. Send Nordyke Music Publishers, 6000 Sunset, Hollywood 28PS, California.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSM, Covina, California.

35A PHONOGRAPH RECORDS

PARTY Records. Sample record and catalog \$1.00 postpaid. Hollywood Jokers, Dept. 7, P. O. Box 1986, Hollywood 28, California.

SEND 25c for sample record and latest low price record lists. Box 333, Cincinnati, Ohio.

RECORDS, Stereo, Monaural, Big Discounts. Write Noelsson, Box 211, New York 5, N. Y.

36 RADIO, TELEVISION, ELECTRONICS, HI-FI

RADIO & TV Tubes at Manufacturers Prices! 100% Guaranteed! Brand New! No re-brands or pulls! United Radio, Box 1000, Newark, New Jersey.

FIX Your Own TV. Save 80%! Send for Free Illustrated Chart showing how! We'll include Giant Electronics Catalog. Zalytron, 220-S West 42nd Street, NYC.

DON'T Buy Hi-Fi Components, Kits, Tape, Tape Recorders until you get our low, low return mail quotes. "We Guarantee Not To Be Undersold." Wholesale Catalog Free. Hi-Fidelity Center, 1797S First Avenue, New York 28, New York.

FREE 444-Page 1961 Allied Electronics Catalog! See products and values available only from Allied. See everything in Stereo hi-fi systems and components; latest money-saving build-your-own Knight-Kits; tape recorders; TV accessories; Public Address systems; world's largest stocks of parts, tubes, transistors, test instruments, tools, books. Only \$2 down on orders up to \$50. Write for value-packed Free catalog! Allied Radio, 100 N. Western Ave., Dept. 112-K, Chicago 80, Ill.

ALL Transistor Radio — Pocketsize. Completely Portable With Battery, Built In Speaker And Antenna. Guaranteed \$9.95 In U.S.A. Alessi Sales, 152 West 42nd St., N. Y. C.

NEW Tubes, 50% Off. Top Brands Top Performance. List Free. Lukacs, Dept. B, Box 353, Jersey City, N. J.

FREE! Giant wholesale catalog on electronics, hi-fi, transistor, scientific, hobby, optics, photographic, housewares, jewelry, tools, novelties, toys. Write: Lektron, 131S Everett Ave., Chelsea 50, Mass.

GOVERNMENT Surplus Snooperscopes, Ham Gear, Mine Detectors, Parabolic Reflectors, Telescopes. Picture Catalog 10c. Meshna, Malden 48, Mass.

CRYSTAL Radio Kit \$1.00 Amplifier and Speaker for same. \$6.95. Catalog. Clearco Crystal Company, 2966 No. 4th, Milwaukee 12, Wisconsin.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSR, Covina, California.

GUARANTEED—Home Tape Recorder, Transistor, Prepaid Only \$34.90. JR Associated, 209 West Jackson, Suite 409, Chicago 6, Illinois.

37 BUSINESS OPPORTUNITIES

YOUR Own Import Mail Order Business! Deal with over 400 manufacturers, exporters of the world. Complete Import procedures, international drop-ship methods. Capital unnecessary. Free details. Associated, Box 2068-PS, Sioux City 4, Iowa.

YOUR envelope addressed accurately, reasonably. Fast service. We have capable addressers in your city. Glenway System, Box 6568, Cleveland 1, Ohio.

GROW Orchids at home. Profitable, fascinating. Successful home grower explains special light, temperature and humidity conditions orchids need. Free—Full details. Orchids, 100 S. Vermont, Los Angeles 4.

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches—sensational new Tenorana, Glamour Girls, Hillbillies; dozens others. All sizes—Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. PX-1060, 7530 Greenwood, Chicago 19, Illinois.

FREE! Name Brands Catalog! Your own high profit business. Sell Name Brands, full or part time. No inventory—no investment. More than 2000 Name Brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi, stereo radios-phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 Floors of Name Brands. Million dollar inventory. Orders shipped complete within 24 hours. Send for Free beautifully illustrated catalog. Now! Separate wholesale price list. H. B. Davis Corp., Dept. 14, 145 West 15 St., New York 11, N. Y.

FREE Picture Folder, "How to Make \$3,000. Yearly. Sparetime. Backyard. Raising Earthworms!" Oakhaven-42, Cedar Hill, Texas.

BRONZE Baby Shoes; Instructions. Equipment and Mountings for genuine Electroplating Process. Largest Supplier of all Plating Equipment, Supplies. Free Catalog. Hollywood Bronze Supply, Dept. B-1, 1624 East First, Los Angeles 33, California.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

IF You Like Motorcycles And Money then send for Harley-Davidson Dealership Book on how to become a dealer of motorcycles and a new line of motor scooters. Here's a chance to own your own business with a very modest investment. The youth market is beginning to explode and the next few years promise a chance to cash in on it. Write for free illustrated Dealership Book Today. Harley-Davidson Motor Company, Dept. P.S., Milwaukee 1, Wisconsin.

\$3.00 HOUR—home, sparetime, assembling pump lamps. Easy. Free Details. Ougor, Caldwell, Arkansas.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm, Plains, Georgia.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

POPULAR SCIENCE OPPORTUNITIES

\$100.00 WEEKLY spare room. Raise red-worms soilless way. Odorless. Charlie Morgan, Box 116C, Bushnell, Florida.

BUY Direct From Factories—Appliances, Cameras, Watches! Free details! Cam Company, 6810PS-20th Ave., Brooklyn 4, New York.

IMMEDIATE Profits with no capital or experience. Take orders for all magazine subscriptions. Friends and neighbors are your prospects. Write now for complete free kit. McGregor Magazine Agency, Dept. 9B, Mount Morris, Illinois.

BIG Money—Operate own Fix-it Shop. Service household appliances, motors, mowers, saws, skates, etc. Free Book, Christy Trades School, A-9901, 3214 Lawrence, Chicago 25.

\$250.00 WEEK spare time profit possible. Earn at home with new fascinating Printing method. \$5 starts you—send no money now. Free Confidential Facts and Valuable sample. Screen-Print, OR, Los Angeles 61.

PLATE Baby Shoes, Jewelry, Gifts, bronze and colored pearl. We finance. Free booklet. Williamson, 11029 South Vermont, Los Angeles 44.

\$1.00 BRINGS You \$18.00 Spare-Full Time Home-Business opportunity! Amazing new velvet-spray transforms old cccccc lamps, TV-radios, figurines, furniture—anything—into \$\$\$\$ products! Free samples. 50 Business Opportunities Booklet. Send No Money. Flok-Kraft OR, Los Angeles 61.

IMPORT-Export opportunity, profitable world-wide, mail-order business from home, without capital, or travel abroad. Established world trader ships instruction for no-risk examination. Experience unnecessary. Free details. Mellinger, C69A, Los Angeles 24.

\$70 WEEKLY—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757D, Los Angeles 34.

LEARN Landscaping And The Growing Of Plants. Start A Profitable Business Part Or Full Time. Free Information Without Obligation. National Landscape Institute, Dept. PSC-100, 11826 San Vicente Blvd., Los Angeles 54, Calif.

INCREDIBLE New "Table-Top" Machine manufactures over 15,000 saleable products. Also laminates, encases, molds and plates in bronze, chrome, or copper. 20c materials produce \$10.00 products. Free Confidential Details and Home-Business Plan. Plasti-Form, Dept. PS-10, Gardena, Calif.

MAILORDER techniques, rules, laws, regulations, Do's, Don'ts. Complete "How-To" Mailorder guide—\$1.00. Dean Products, Box 40-PS, Elberton, Georgia.

INVISIBLE Re-Weaving; \$5-\$10 per job possible re-weaving burns, tears, moth-holes. Spare-Full time. Free details. Skill-Weave, Dept. WC-1310, 335 W. Madison, Chicago 6, Illinois.

PACKAGE At Home For Profit! We Supply Everything. No selling; ready market. Free details. HPC 2212AL, Jesse Street, Los Angeles 23.

MAIL Order Franchise. No experience needed. Spencer Gifts, a well-established and successful mail order firm, starts you in business. Supplies catalogs with your own name imprinted. No investment in stock. No shipping merchandise. Catalog items pre-tested for salability. Initial investment of less than \$50 can get you started. Write for Free information kit. Spencer Gifts, CJ-51, Spencer Building, Atlantic City, N. J.

MAILORDER Beginners no cost plan. Armstrong's, 154 Darrington S.W., Washington 24, D.C.

DOLLS! Dolls! Dolls! We teach you to repair, make, sell all kinds of dolls and accessories including clothing. Study at home. Earn while you learn. Free catalog. Doll Hospital School, Studio PSC-100, 11826 San Vicente Blvd., Los Angeles 49, Calif.

"JAPAN—European Directory." Source —"17 Jeweled watches—\$3.75"; "30 Free Foreign Wholesale catalogs." 50,000 Foreign Bargains Directory—\$1.00. Dean Products, Box 40-PS, Elberton, Georgia.

SELL Books By Mail. 400% profit. Royal, Box 368-M, Cleveland 27, Ohio.

IMPORT-Export Business made easy. Individual setup service. Not just instructions. Hermes, 152 West 42, New York City 36.

MAILORDER To Motels, Institutions, Churches. Complete individual set-up, not just instructions. Hermes Advertising, 152 West 42, New York City 36.

AVERAGE Man Needed Who Wants To Earn Above-Average Income In Full or Spare Time. Your area is wide open for an independent Greeting Card rack distributor. Be your own boss servicing stores of all types with exclusive fine quality Christmas and All Occasion greeting Cards. Studio and traditional designs. No previous experience needed. Established route can bring steady income. Small investment required can be paid off with initial profits. Write at once to: Treasure Greetings, 23 Lake Street, Elmira, New York.

START Profitable Distributing Business. Free Literature. Byrite, 3310 Walnut, Findlay, Ohio.

CANDLEMAKING & Decorating. Terrific Hobby. Great Business. Learn fascinating molding, dipping, creating & decorating candles for year-round demand—holidays, birthdays, weddings, anniversaries, All Events. Spare time fun & extra income now, expand to colorful candle shop later. No age limit. Write for Free Facts on home instruction method. Candlecraft Institute, Dept. X-167, Fallbrook, Calif.

EXCEPTIONALLY profitable opportunity in Tape Recording! Free Information. Baron's, Lynden, Washington.

NEW Home-Import Mail Order Profitability! Your mailbox stuffed with money! No selling. No experience. No investment. We supply everything. Free Details. Mail Order Distributors, (Import Division) Dept. B6AC, 15201 South Broadway, Los Angeles, Calif.

EARN Good Money sharpening chain saws, scissors, cutters, knives. Free Manual. Treyco, North Tonawanda 1, New York.

VENDING Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 18, 715 Ensor Street, Baltimore 2, Maryland.

MARKETS Everywhere. Make Artistic concrete birdbaths, pottery. Best coloring. Home workshop. Hundred varieties. Hollywood Cementcraft, 8527-N Wonderland, Hollywood, 46, California.

PLASTERCRAFT molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

WANT Greatest Cash Crop working for you? Write Ginseng, Asheville, N. C.

FRANCHISES make profits! Operate your own exclusive franchised business. Write today for free interesting details. National Franchise Reports, Y-528, 333 North Michigan, Chicago 1.

REPAIR Dolls; Make Rubber Stamps. Catalog "75 Ideas" Free. Universal, Box 1076-B, Peoria, Ill.

VALUABLE "Mailorder Business Franchise" absolutely free. Neil H. Tasker, Shamokin, Pennsylvania.

MAKE Figurines. Rubber for Molds, Extra Thick. Free sample. W. Wooley, 2801-B Latrobe, Peoria, Ill.

OPPORTUNITY to earn \$15,000-\$30,000 annually. Franchise protected. Granted on \$12,500 basis. Live at home. No merchandise to buy. Selfemployed. One of most exclusive and noncompetitive Businesses in United States and Canada. Send for free explanatory booklet. Harrell and Company, Box 8-D, Louisville, Illinois.

FREE Book "990 Successful, Little-known Businesses." Work home! Plymouth 52M, Brooklyn 4, New York.

RE-Cast junk batteries into new. Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

TV Tube Tester \$99.00. Locate in Drug Stores, etc., for quick profits. New tubes 50% off. Details. M & M Tube Service, 7503 Emerson, Morton Grove, Illinois.

100% PROFIT selling reconditioned spark plugs. Free Sample. Lee, 1608-K Roberts, Houston 3, Texas.

FLOCKING Christmas trees is quick profit business. Free catalog tells how. Large and small production equipment. Mail Store, 1147 Greenleaf, Wilmette, Illinois.

LIQUID Molding Rubber. Free Sample. Shellcraft Supplies, Chaney's, 1907-C East Road, Jacksonville 11, Fla.

\$128.00 PROFITS in one week. Everything furnished. No investment. Amazing 45 RPM record reveals greatest profit making, part time, Home Mail Order Opportunity ever offered. "Ferguson received 52 orders one day". Record mailed postpaid. Send \$2.00 (refundable) to Jesco Gifts, P.O. Box 411-W, 401 Cravens Building, Oklahoma City 1, Oklahoma.

\$34.70 TWO hours. Manufacturing Concrete Products. No Selling. Castings #2, 2907 Dundee, Rapid City, South Dakota.

FIND out how you can double your investment in six months. Guaranteed you cannot lose your initial investment. Never purchase anything—money never leaves your possession. It has not failed in the past 22 years. For complete information, send \$1.00 cash, check, money order, or stamps to: The Charles System, Box 265, Knoxville, Tenn.

YOU too can make money through Popular Science classified advertising. If you have a product or service which can be sold by mail, send now for the amazing new booklet, "How to Make Money Through Classified Advertising." It's chock full of valuable suggestions, time-tested mail order formulas and lots of "how-to" info. It tells you what, where, when and how to advertise. For your copy, just send 10c to cover postage and handling to O.K. Kelly, Classified Adv. Mgr., Dept. 370, Popular Science Monthly, 355 Lexington Avenue, New York 17, N. Y.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Illinois. (Founded 1935.)

CANDIED Popcorn and Potato Chip Equipment. Eakins, Box 933-BO, Springfield, Ohio.

"HOW to Operate Profitable Mail Order Business". Write: American Distributors, Box 409-S, Niles, Michigan.

PROFITABLE Hobby—Home Mailorder Business—Easy. Write: Trotta, JPA-2036—66th, Brooklyn 4, New York.

\$75.00 WEEKLY possible mailing catalogs. Roe, 2317M Marshall, Chicago 23, Ill.

MAKE \$46 From Square Foot Plywood; Jigsaw necessary. Free Details. Woodarts, Bridgewater, Mass.

OPERATE home Mail-order Business. Vosacek Printing, 4444PS Ute, San Diego 17, Calif.

AMAZING mail order opportunity, complete set-up, not folio, powerful selling literature furnished, orders drop-shipped, proven, guaranteed profitable. Act. Mail Trade Contacts, Montrose 4, N. Y.

NEW, necessary household tool Hardware, Houseware, Variety Stores don't miss. Sells itself, good commission, free sample. The Hestle Company, 200 Chestnut, Roselle Park, New Jersey.

FREE Details! Make money at home. Respectable field. Experience unnecessary. No public contact. Free help. Columbia, 45-09-PS Broadway, Long Island City 3, New York.

HOW and where to raise capital. Details free. Financial, 1825 Valley Road, Springfield, Missouri.

AMAZING profits manufacturing concrete drain tile with simple patented machine. Ceeten Products, Cornelia, Ga.

POPULAR SCIENCE OPPORTUNITIES

RARE opportunity to become an exclusive dealer for America's largest producers of Aluminum Home and Commercial Additions with Honeycomb Insulation. Requires \$3390 for inventory. Write or wire including phone to National Sales Division, Power-Matics, Inc., 1572 Stillwell Ave., Bronx, N. Y. TYrone 2-4400.

BAKE New Greaseless Doughnuts In Kitchen. Sell stores. Free recipes. Summers. 3605 South 15th, Minneapolis 7, Minnesota.

37A INVESTMENTS

"**WORTHLESS**" securities may be valuable. Thousands dollars await claiming. Information \$1.00. Confidential Reports, Box 2103, Dayton 29, Ohio.

38 MONEYMAKING OPPORTUNITIES

EASY to Earn Extra Money! Free 100 page Catalog. Tandy Leather Company, Box 791, S37, Fort Worth, Texas.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-11, Plains, Ga.

TEAR Out This Ad. and mail with name, address for big box of home needs and cosmetics for Free Trial, to test in your home. Tell your friends, make money. Rush name, Blair, Dept. 55DT, Lynchburg, Va.

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 88th, New York 24.

MAKE \$5,000 yearly sparetime raising mink, chinchillas, nutria, etc. Free booklet reveals proved plans. Write: Furs, 588 Mt. Pleasant Road, Toronto 2, Canada.

BUSINESS Kit Free! Postcard puts you in business. Complete line 230 shoe styles, also jackets! New discoveries pay Big Commissions. No investment. Send for Free Kit. Mason, Chippewa Falls K-325, Wisconsin.

MAKE Money Writing Short Paragraphs! No tedious study. I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell right away. Send for free facts. Benson Barrett, Dept. C-86A-X, 7464 Clark, Chicago 26.

CIGARETTES—Make 20 plain or filter-tips for 9c. Facts free. Moberly, Box 911, Owensboro, Kentucky.

100% PROFIT. No Investment. Stamp brings Samples, Details. Miller's, Box 584, Brooklyn 1, New York.

START Big-Pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-3-L, Chicago 26, Illinois.

50% PROFIT—Selling Mailorder folios. Dean Products, Box 40-PS, Elberton, Georgia.

HOW much money do you want? Become a distributor of a nationally advertised product with a proven sales technique and name your own goal. For information describing the product, the completely different personal contact sales technique, and how you may become a distributor of this product send your name and address to: Edward Stewart, P. O. Box 3343, Long Beach, California.

SHELLCRAFT Supplies. Highest Quality. Lowest Prices. Large Catalogue 25c. Pace's, Cortez 2, Florida.

TERRIFIC Novelty sells itself—be convinced—Show friends. Sample 25c (Refunded First Order). Stein, 311 N. Delsea Drive, Woodbury, New Jersey.

SPARE Time Can Mean Extra Cash For You. With no experience, no big investment, you can earn fantastic profits! Take orders with big, colorfully illustrated catalog of toys, jewelry, gifts, collector's items, household gadgets. Work your own hours. Write for free catalog: North Star, Dept. 6-610, 251 East Fifth Street, St. Paul 1, Minnesota.

EASY to start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-3-L, Chicago 26.

VENDING Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 19, 715 Ensor Street, Baltimore 2, Maryland.

AMAZING successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, SP-528, 333 North Michigan, Chicago 1.

RED Hot Items, timely, unique, Mail Order Or Direct Sales. \$1.00 brings samples. Refundable. Artcraft, 321 W. Cumberland, Knoxville 2, Tenn.

MEN — Women! Start Money-Making Plastic Laminating Business at home in spare time. Material that costs 11c brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars Free. Rush name on postcard to Warner, Room CL-3-L, 1512 Jarvis, Chicago 26, Ill.

IN 1952 I was unemployed, broke. Today own \$18,000 home, drive Cadillac, have bank account. Anyone can do this. N. Cole, 217 West 49th, Bradenton, Florida.

GET Listed for life! Receive hundreds free magazines, samples, special offers. Rush 25c, stamped, addressed envelope. Columbia, 45-09-SN Broadway, Long Island City, New York.

WIRE Bending Kit: Includes Tools, Illustrated Projects, Complete instructions and free catalog covering profitable wire hobbies. \$1.00 postpaid. Jon-Cee Products, 1203P Ford Rd., Cleveland 24, Ohio.

"HOW to Make Money Through Classified Advertising." If you have a product or service which can be operated on a mail order basis, don't fail to read this book. Thousands of people have made money selling through mail order—you can too. This booklet tells you what, where, when and how to advertise. It contains scores of valuable hints on writing copy, keying ads, analyzing results, etc. Get your copy now. Just send 10c to cover postage and handling to O.K. Kelly, Dept. 380, Popular Science Monthly, 355 Lexington Avenue, New York 17, N. Y.

\$200.00 MONTHLY. Spare Time. With Tablesaw, Bandsaw or Jigsaw. Write. Holiday House, 7222 4th Plain, Vancouver, Washington.

MAKE good income typing at home! Detailed information \$1 (refundable). Ryco Service, 210-H Fifth Avenue, Suite 1102, New York 10.

LOADS "O" Mail: Free samples, money making offers. Get listed "for life." 25c. Burns Co., 6228 Aldama, Los Angeles 42, Calif.

FREE Details! Make money at home. Respectable field. Experience unnecessary. No public contact. Free help. Columbia, 45-09-S Broadway, Long Island City 3, New York.

\$1,000—\$10,000. YEARLY Possible, raising Fish Worms! Full, sparetime; backyard, garage, basement, spare room. Sell your crop to us! Send name to: Red Wiggles, Warsaw 3, Indiana.

PROFITABLE Mailorder Operations! Write Vikari's, 468-PS3 Third Avenue, Salt Lake City 3, Utah.

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior EE, Wisconsin.

MAKE Money Clipping Newspapers. For information, write, Newscraft, PS-983-E, Main, Columbus 5, Ohio.

COLLECT Overdue accounts. 100 collection forms, \$5 postpaid. Send check or M.O. Franklin Press, R-2, Frankfort, Ky.

\$15.00 THOUSAND addressing envelopes, postcards, home—longhand, typewriter. Particulars free. R. Economy, Box 2580, Greensboro, North Carolina.

MAKE Big Money with fast-selling line self-help Manuscripts—many titles! Imprints available; drop shipments if desired! Complete details to Established Mailorder Dealers only! Economy, Box 2580-PS, Greensboro, North Carolina.

MAIL Order success secrets revealed by new magazine. Free details. Mail Order Business, Dept. L-103, 550 Fifth Ave., New York 36.

NEW look, embossing on plastic tapes. Send 50c for 6 samples. Fast seller. Economy, 2829 1/4 Rowena Ave., Los Angeles, Calif.

BIG Profits in pest control, full time—part time. Free details. Baylab, Box 21, Cambridge, Maryland.

JUST 1 hour a day. Earn up to \$1870 per month. We need circular mailers. Experience not required. Free details. George Thacker, 11007 Maple Avenue, Bloomington, Calif.

38A BUY IT WHOLESALE

LARGEST Wholesale Supply Source in U.S. Get free catalogs. Furniture, clothing, appliances, autos and accessories, farm equipment, tools, housewares, hobby supplies. Free details. Associated Wholesalers, Box 2068-C, Sioux City 4, Iowa.

FACTORY Prices! Thousands Nationally Advertised Products. Typewriters, housewares, jewelry, watches, appliances, television, cameras, etc. New factory buying plan saves up to 40% below wholesale. Details Free. Factory Supply Company, Bloomfield 3, New Jersey.

PHOTOGRAPHIC equipment. Free wholesale catalog. RNG Sales, PS, Wildomar, California.

NEW DeLuxe Multicolor wholesale catalog, automobile catalog, and others. Nationally advertised merchandise. Housewares, appliances, refrigerators, freezers, washers, dryers, television, radios, rugs, furniture, sewing machines, clothing, luggage, binoculars, phonographs, musical instruments, recorders, cameras, projectors, typewriters, power tools, toys, notions, sporting goods, watches, jewelry, novelties, vitamins, drug sundries, cosmetics, books, school supplies, practically everything. Famous brands. Huge discounts up to 40 to 70%. Postcard: Selbyco, Decatur 6, Illinois.

100,000 PRODUCTS Wholesale! Terrific Bargains! United Wholesalers, 1265 Broadway, New York 1, N. Y.

FREE Money-Saving Catalog. Surplus and newly manufactured equipment and tools for workshop, home, boats, farm, factory. Write: Groban, 1139 South Wabash, Chicago 5, Illinois.

WHOLESALE! World's Largest Supply. Buy from 679 American, European, Japanese wholesalers. Tailormade suits from Hongkong. 123 dropship catalogs. Rock-bottom prices. Free details. International Buyers, 216-PS Jackson, Chicago 6, Illinois.

2,000 PAGES Wholesale Catalogs. Write. Mosaser, Box 47-A, Newark, Ohio.

ENGRAVED Nameplates For Homes. Solid Brass, 5x2"—\$2.00. Bird Engraving Co., Box 5, Somerville 43, Mass.

ELECTRIC Guitars, amplifiers, wholesale. Free Catalog. Carvin, PSW, Covina, California.

TREMENDOUS Wholesale Buys! Big Catalog! Postcard: Spartan, Box 1204A, Chicago 90.

BELOW Wholesale most merchandise. Write Factory Buyers, 446 Jacksonville, Illinois.

38B IMPORT-EXPORT

IMPORT Bargains, Free Gifts, Catalog 25c. Carle Distributors, 2 Empire Street, Buffalo 12-P, New York.

39 FORMULAS, PLANS, ETC.

FORMULAS—All Kinds—Moneymakers. Three catalogs, Dime. Kemico, Park Ridge 15, Illinois.

LATE Modern Manufacturing Formulas List Free. Chemical Service, Martville, New York.

SPECIAL Formulas for latest money-making discoveries. New! Good! Profitable! Valuable Literature Free! Miller, Chemist, 1517-N, Tampa, Florida.

40 PLASTICS

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25c for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. L-102, Woodstock, Illinois.

PLASTIC, Vinylite laminating supplies, machines. Solomonson, Everett 49, Mass.

PLASTICS and accessories for casting, molding, embedding and jewelry. Make unique Christmas gifts for pleasure or profit. Send 25c for 64 page catalog. Cast-a-craft Corporation, Dept. S-10, Box 555, Palo Alto, Calif.

PLASTIC Vacuum-Forming Machine. Hobby. Easy. Profitable. Details. Burr, 330 East Centre, Kalamazoo, Michigan.

PLEXIGLAS — Any thickness — Clear — Colors — Cut to size — Clear Rods — Tubing. McClarin Plastics, P.O. Box 168B, Hanover, Pennsylvania.

PLASTIC Embedding for fun and profit, no oven. Make beautiful jewelry, decorative panels, science specimen castings. Catalog 25c. Natcol Plastics, Box 444, Yucaipa 4, California.

CELLULOSE scrap. Sheets, state thickness, colors. Box 333, Kearney, New Jersey.

41 SCIENCE & CHEMISTRY

AMAZING New Book Of Science Experiments, formulas and Catalogue of Laboratory Supplies. Only 35c. National Scientific Co., Dept. PS-10, 13 S. Park Avenue, Lombard, Illinois.

232 PAGE Catalog \$2.00. Laboratory Materials, 7319 Vincennes, Chicago, Illinois.

CATALOGUES, completely priced — Chemistry, Physics, Microbiology, Minerals & Rocks, Entomology, 25c. Amateur Chemist & Microbiologist, 208 E. 11th St., Kansas City, Mo.

LABORATORY Kits—for any study in Microscopy, Bacteriology, Hydrobiology, Mineralogy, Catalogue 25c. Instruction booklet Microscopy \$1.25. Jackel Mfg., 209 E. 14, New York 3.

MAGNETS assorted dozen \$1.50. Ronald Eyrich, Robin Lane, Brookfield, Wisconsin.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 25c. Tracey Laboratories, Evanston, Illinois.

ECONOMICALLY Priced! Laboratory Materials. Catalogue 25c. Starr Scientific, Manitowoc, Wisconsin.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.

MICROSCOPE slides, anatomical. Free list. Bay, 409 Roosevelt Way, San Francisco 14, California.

EXPERIMENTERS: New! Bigger Catalog and "Experiments Booklet". Only 25c. Hagenow Laboratories, Manitowoc, Wisconsin.

CHEMICALS, apparatus, glassware. Illustrated catalogue 25c. Bio Chemical Products, 30P Somerset, Belmont 78, Massachusetts.

ROCKETEERS: Illustrated Catalog. Plans, Formulas 25c. Central Rocket Company, Waupaca, Wis.

ILLUSTRATED chemistry supply catalog 25c. Winn Chemicals, 124 West 23rd Street, New York 11.

WHOLESALE rocket chemicals, apparatus. Catalog 25c. Keefe Scientific, 159-10 Hillside Avenue, Jamaica, New York.

CHEMISTRY—Science—Rocketry. Catalog 25c (refundable). Lankton Bureau, Summerland Key, Fla.

BOOKLETS: "Chemistry", "Physics", "Astronomy", "Science", "Relativity", "Electricity", "Radio", "Light", "Tables", "Mathematics", 10c Each. Franks, 3121 South Racine, Chicago 8.

UNUSUAL Chemistry books, courses, kits! Rare chemicals, cheap! Catalog 25c. National, Box 133-A, Palo Alto, Calif.

CHEMISTRY Catalog 25c. Expendables Kit offer! Laboratory Sales, Box 161-B, Brighton, Mass.

MICROSCOPES, educational, research, surveying. Instruments, electronics, optical, everything Japanese. Importers' prices, catalogs 25c. Magnification Instrument, 2 E. 45th, New York 17.

42 HELP WANTED REPORTS

FREE Information — USA Overseas Jobs. High Pay, Transportation—Futures. Dept. P, 215 West 34th Street, New York City 1.

FOREIGN Jobs—Latin America, Alaska, Canada, up to \$1500 monthly. Up-to-date 1960 Foreign Service Directory gives complete information; hot list of firms hiring for Military and Civilian Construction, Aircraft, Oil, Exporters-Importers, Mining. How-When-Where to apply. 12th Successful year, \$1.00. Global Reports, Box 8873-P, Los Angeles 8, California.

HIGH Pay Overseas. Domestic Jobs. Men, Women. Generous Benefits. Companies Pay Transportation. For Info; write: World Wide, Dept. C-4, 149 N. Franklin St., Hempstead, N. Y.

FOREIGN Employment Information. Work overseas. Travel, adventure. Europe, Africa, Asia, Canada, Alaska. Earn as much as \$1,600 monthly. Construction men, truck drivers, clerks, teachers, professionals, etc. Fabulous opportunities. Most complete information, application blanks, etc. Sent by return mail same day received. Send \$2.00 to Dept. PS, Foreign Bureau, P. O. Box 512, New Orleans, Louisiana.

JOBS on Steamships and Yachts, traveling foreign countries. Davenport's, 1354-J, GPO, New York 1, New York.

JOBS: High pay. Foreign countries. USA. All trades. Write Dept. 55E, National Employment Information, 1020 Broad, Newark, N. J.

JAPAN! Far East! Many hi-paying jobs available now. All types. Complete, detailed reports \$2.00. Walts, Box 903, C.P.O., Tokyo.

GOOD Salaries—Petroleum, Construction, Manufacturing, Teachers, Etc. Technical, Professional Personnel. Travel paid. Living allowances, Bonuses, U.S. Tax Exempt. Information \$2.25 air mailed. Colombian Opportunities, Apartado Aereo 14448, Bogota, Colombia.

JOBS Abroad. Top pay with travel, adventure, unlimited opportunities. Latest report covers construction, oil, shipping, aviation, governmental and international organizations. Skilled, unskilled, clerical, supervisors, engineers. Only \$2.00. Money-back guarantee. Included free, "Student Opportunities Abroad" and "Jobs on Yachts." Covington Distributors, Box 704-J, Camden 1, New Jersey.

AMERICAN—Overseas, Land—Sea Jobs. Higher Pay. Transportation—Benefits. Men—Women. More Details. Write: Employment Headquarters, 79 Wall Street, Dept. D-13, New York 5.

FLORIDA Opportunities. Don't make a move without this Report on Job Opportunities. Living Costs; Give Qualifications. \$1.00 gives you personal reply. Florida Facts, P. O. Box 651, North Miami Beach, Florida.

JOBS, Ships. \$100 Weekly Beginners Travel, Adventure. Details Free. Seamen's Service, Box 17-P, Brooklyn 8, N. Y.

LIVE in sunny Florida! Guaranteed qualified job listings send \$1.00 and job classification. Tropical Employment, Box 3073, West Hollywood, Florida.

43 AGENTS WANTED

YOUR Own business—Suits \$1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. Nathan Portnoy Associates, 2109-J Roosevelt Road, Chicago 8, Ill.

EVERY Man A Prospect. Request refundable sales kit offer showing line of belt buckles, tie clasps, money clips, cuff links, lapels, individualized with customer's name and emblems. Cap badges for trucking, bus, taxi, police, firemen, also heavy construction emblems. Choice 3000 emblems. Hookfast, Box 1425PS, Providence, R. I.

START Your Own Business On Credit (U.S. and Canada). Your own boss. 1396 Dealers sold \$5,000 to \$25,000 in 1959. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. J-U-PSC, Freeport, Ill.

MONEY-Making Opportunity! Take big profit orders for world famous Patented Varieties Fruit Trees. Also Flowering Shrubs, Roses, Vines. Big Sales outfit Free. Stark Bro's, Desk 30101, Louisiana, Missouri.

JAPAN'S Finest. Exotic Earrings! Details Free. Ohga, PSER201, Sigakenkusatu, Japan.

ANYONE can sell famous Hoover Uniforms for beauty shops, waitresses, nurses, doctors, others. Miracle fabrics Nylon, Daeron, Wash 'N Wear Cottons. Exclusive styles, top quality. Big income, real future. Equipment free. Hoover, Dept. M-101, New York 11, N. Y.

FREE! Beautiful Mexican curios! Rush 30c stamps mailing. Sylvial, Apartado 9036, Mexico City.

AUTOMATIC bed warming sheet, you sleep on, not under. Outlets electric blankets 10 ways, costs less. Generous profits. Patented Products Corp., Dept. PS1060, Danville, Ohio.

SEEKING New Products? Get my outfit 47 moneymaking specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee, 76, Akron, Ohio.

MAKE \$10-\$100 A Day! Sell New 5 Year Light Bulbs. Guaranteed. Send For Sample 6 Pack \$1.98, Sells For \$4.69. Free Details. Sunmaster, 366 Fifth Ave., Dept. 10PSC, New York City.

EARN Extra income without changing jobs! Use your spare time for profits. Show, sell fascinating new gifts, greeting cards, gadgets, novelties, toys, jewelry and cosmetics—make up to 92% profit! Write today for free money-making kit and colorful catalog. Samples on approval. No obligation. Greetings Unlimited, 6-212 Park Square, St. Paul 1, Minn.

WILL you wear new suits and topcoats without one penny cost and agree to show them to friends? You can make up to \$30.00 in a day even in spare time, without canvassing. W. Z. Gibson, Inc., 500 S. Throop St., Dept. L-626, Chicago 7, Ill.

AGENTS—300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-E West Newport, Chicago.

NEW Car Thief Signal. Lightning Seller. Thirty Day Trial. Northwest Electric, 506 Mitchell, South Dakota.

CALENDARS, Advertising Novelties, Matches. All styles, including Religious. Varnished 12 sheets. Girls. Hundreds of Advertising Novelties, Book Matches, etc. Fleming Calendar Co., Promotional Division, 6539 Cottage Grove, Chicago 37, Ill.

GOLD or Silver letters, numbers. Windows, Doors, Trucks 1" to 6" 500% Profit —Free Samples. Atlas-U, Box 543, Oak Lawn, Ill.

BUSINESS of your own. Earning potential as high as \$40,000 annually. Issued on \$12,500 base. No merchandise to buy. Send for free explanatory booklet. Harrell & Company, Box 8-DD, Louisville, Ill.

MAKE Profitable Men's-Women's wear. Sample Free. Sunmade, Brockton 64, Massachusetts.

AUTOMATIC Fire Extinguisher. Salesman cost \$3.95. Out-O-Matic, 1737H East 31st Avenue, Denver 5, Colorado.

"FOG-STOP" Windshield Cloth. Instantly removes blurry Mist, Frost, Sleet, Snow. Stops windshield fogging. Samples sent on trial. Kristee 75, Akron, Ohio.

REAL Diamond Rings. Nationally advertised. Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleam-light, 111-R10 North Columbus, Mount Vernon, N. Y.

POPULAR SCIENCE OPPORTUNITIES

BIG Profits—Stamp Social Security Plates Key Protectors, Sample—50c. Catalog Free. General Products, 11 No. Pearl St., Albany 7, N. Y.

MAKE up to 150% selling quality French perfume types at 1/2 retail! Free sales kit. Exclusive territory. Jule, Suite 1310, 530 Arlington, Chicago 14.

44 HIGH-GRADE SALESMEN

WILL You test new items in your home? Surprisingly big pay. Latest conveniences for home, car. Send no money. Just your name. Kristee, 102, Akron, Ohio.

YOUR free copy of World's biggest sales magazine tells you how and where to make more money on your own in selling. Write Specialty Salesman Magazine, Desk 6B, 307 North Michigan, Chicago 1.

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches—sensational new Tenoramas, Glamour Girls, Hillbillies; dozens others. All sizes—Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. P-1060, 7530 Greenwood, Chicago 19, Ill.

MAKE Extra Money Selling advertising matchbooks. Free catalog and sales outfit. Matchcorp, Dept. PS-100, Chicago 32.

IF you're interested in making money in selling, see the hundreds of exceptional opportunities in Salesman's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 18, Chicago 10, Illinois.

\$1,000.00 A month for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only \$4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P66U, New York 16.

SENSATIONAL new longer-burning Light Bulb. Amazing Free Replacement Guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-74U, New York 16.

45 EDUCATIONAL & INSTRUCTION

LEARN While Asleep with your recorder, phonograph or amazing new "Electronic Educator" endless tape recorded. Details free. Research Association, Box 24-NN, Olympia, Washington.

HIGH School Diploma at home. Licensed teachers. Approved materials. Southern States Academy, Station E-12, Atlanta, Ga.

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

MASTER Watchmaking at home. Free sample lesson. Chicago School, 2328-WK, Milwaukee, Chicago 47.

WANT a Diesel Job? Higher Pay? Advancement? We can help you qualify! Complete Diesel, Tractor and Heavy Equipment and Cummins Diesel Engine Shop-method home-training courses available. Write today. Interstate Training Service, Dept. B-2, Portland 12, Ore.

COMPLETE Your High School at home in spare time with 63-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X746, Drexel at 58th, Chicago 37, Illinois.

GOOD paying jobs open! Operate, repair heavy earth moving equipment! Learn "on the job" operating latest cranes, bulldozers, earth carriers! V.A. Approved. Free Catalog. Write N.L. Hutch, Greer Technical Institute, Braidwood, Illinois.

BOOKKEEPERS — Operate Your Own "Dollar-A-Week" System. Ellis, Box 200, Cedar Grove, North Carolina.

DEVELOP Your voice—for more success in business, social life! Free booklet. (Give age.) PV Institute, 210 South Clinton, Studio EP-1, Chicago 6.

ENGINEERING and Art Degrees earned through home study. Electronics, Electrical, Mechanical, Civil, Physics, Liberal Arts. When writing, specify course desired. Pacific International College of Arts & Sciences, primarily a correspondence school. Resident classes also carried. 5719-A Santa Monica Boulevard, Hollywood 38, California.

ANALYZE Handwriting for profit, pleasure. Free sample lesson, catalog reveals plan. Write Igas, Inc., Dept. 1, Springfield 4, Missouri.

LEARN Auctioneering. Free catalog. Missouri Auction School, Box 9252X5, Kansas City, Missouri.

BE A Real Estate Broker. Insure Security for yourself and your family. Study at home. Prepare for state examination. GI approved. Write for Free Book Today. Weaver School of Real Estate, 2018R Grand, Kansas City, Missouri.

GAME Warden, Government Hunter, Forestry, Park and wildlife service announce job openings regularly. Enjoy outdoor work, good pay, real security. Complete information Free! Write North American School of Conservation, Dept. 18BB, 810 Dodsworth, Covina, Calif.

CIVIL Service. Learn about this field of work and how you can prepare yourself by home study for a high entrance mark. Private organization. Free booklet. No obligation. Franklin Institute, Dept. W32, Rochester 4, N. Y.

BECOME Tax Consultant. Graduates earn \$1,000-\$3,000 every tax season preparing returns evenings. State approved. Union Institute, Lakewood 1R, N. J.

FINGERPRINTING Course \$12.00 Diploma Awarded. Details Free. Alabama School of Fingerprinting, Box 185-B, Fairfield, Alabama.

LEARN Civil and criminal investigation at home. Earn steady, good pay. State age. Institute Applied Science, 1930 Sunnyside, Dept. 337, Chicago 40, Illinois.

"HOW To Train Horses"—A book every one who likes horses should have. Free. No obligation. Simply address Beery School, Dept. 5810, Pleasant Hill, Ohio.

INTERIOR Decoration: Approved supervised home study training. Fine starting point for career. No classes. Text and work kit furnished. Diploma awarded. Low tuition and payment. Send for free booklet. Chicago School of Interior Decoration, 835 Diversey Pkwy., Dept. 1727, Chicago 14, Ill.

ORIENTAL wisdom explained. Personal instruction. Rev. R. Lin, 1612-2C Dole Street, Honolulu, Hawaii.

PATENT specification writing taught. Patentry, 610 "C" Southeast, Washington, D. C.

PIANO Tuning Pays. Big money in spare time. Learn at home in 30 days. No musical knowledge necessary. Phonograph, records, tools and instructions furnished. Personal instructions available. Free catalog. Capital Tuning School, 3160 S.W. 16th Court, Ft. Lauderdale, Fla.

FREE General Catalog—100 Pages Text vocational, educational, instructional subjects. Millions of volumes, new and used. Bargain prices. Books bought. Est. 1902. Long's College Book Co., Dept. PS, Columbus 1, Ohio.

OWN local collection office. Pays big. Franklin Credit, Roanoke, Virginia.

JUDO. Complete self-study course. Learn all secret blows, grips, pressures. Detailed illustrations \$1. Len Company, Box R101, Bath Beach, Brooklyn 14, New York.

EARN While You Learn Auto and Diesel Mechanics. Master this top paying trade. Many graduates earn \$100 a week and up. Approved for Korean veterans. For free information write Dept. No. 262, Nashville Auto-Diesel College, Nashville 3, Tenn.

TECHNICAL Writing Career for Higher Pay. Security. Thousands needed by Industry. Details Free. Train at Home. Publication Consultants, P. O. Box 651, North Miami Beach, Florida.

REAL Estate Course. Economical Home-study. Prospectus Free. Howard Schools, 322 Glover Building, Kansas City 5, Missouri.

"TRUTH About Correspondence Colleges." Recognized? State Laws, Charters. Controversial! Details free. Aurie, Central Valley, New York.

ORGAN Instruction—New Approach; Free Details. Afsco Publishers, 414 E. Valley, San Gabriel, California.

BEAT rising college expenses. Select list of scholarships, financial aids, loans, and major university fees. Send \$2.00. Richard's Brochures, Box 2223-A, Oxnard, California.

USED Correspondence Courses (Bought and Sold) Money Back Guarantee. Gem, Dept. 10-S, Linwood, New Jersey.

WANT that promotion—better job? Details free. F. M. Publications, 5415 York Blvd., Los Angeles 42, Calif.

BULLDOZER Operation! Learn How At Home. Bulldozer Training, Box 7400, Washington 4, D. C.

NEW, amazing Subconscious Method for Effective Speaking, Improved Singing, Master Salesmanship, Dynamic Concentration and Powerful Memory, along with Twenty other Revolutionary Courses. Works wonders—easy—pleasant. Guaranteed. Write Beta Distributing Company, P. O. Box 765, Chicago 90, Illinois.

46 CONTESTS

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25c. General Contests, 1609-A East 5th, Duluth 12, Minnesota.

MONTHLY Puzzle contests: Cash Prizes! Spence, Box 11569, St. Petersburg, Fla.

WIN Contests. Contests—Books—Helps. United, 25 Earl, Red Bank, N. J.

PRIZE Contest Information. Send dime. Guidebook, Box 246, Decorah, Iowa.

"HOW To Win Prize Contests" \$1.00. R. Plumb, Herkimer, N. Y.

47 DETECTIVES

DETECTIVE Profession. Home Study. Badge, Certificate, Future. Box 41197-G, Los Angeles 41, California.

DETECTIVE Training. Phillips Secret Service System, 1917-C North Kenneth, Chicago 39, Ill.

DETECTIVE Training — Free Booklet covering approved home-study plan. Write National Detective Academy, Dept. E, 722 West Chapman Avenue, Orange, California.

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 24.

48 LANGUAGE OUTFITS

LEARN world interlanguage endorsed by Unesco. Free lesson. Esperanto, Middleton, Wisconsin.

50 BUSINESS SERVICE, INFORMATION, NAME LISTS

LIVE Names Available—Buyers, Prospects! (200,000 Mailorder Book; 15,000 Earthworms). D. Dickman Company, Willow Springs, Missouri.

52 AUTHORS SERVICE

WANT Your Book Published? Learn how we publish, advertise, promote, distribute. Many successes. Free booklet PS. Vantage, 120 West 31, New York.

53 ADVERTISING, AGENCIES, ETC., FOR ADVERTISERS

FREE expert assistance for mailorder advertisers. Ratebook leading newspapers, magazines, 10c. Chicago Advertising Agency, 28 E. Jackson, Chicago 4.

POPULAR SCIENCE OPPORTUNITIES

SAVE! Circulars, brochures, folders, etc. Designed and printed. Samples. Flair, 8 West 45th, New York City 36.

ADVERTISE "Mail Order Weekly" 2c per word. \$1.00 minimum. Sample Copy 10c. Hartford, 2704 W 32, Denver 11, Colo.

FREE! Red-hot book, "More Profit From Your Advertising." Lists best Mail Order Magazines, Newspapers. Adservice, 516A Cornelia, Chicago 13.

JUST Out! Amazing new booklet, "How to Make Money Through Classified Advertising." This booklet is "must" reading for all mail order men. It tells you what, where, when and how to advertise. Contains scores of valuable hints on keying ads, writing copy, analyzing results, etc. If you advertise now, or ever plan to, don't fail to study this booklet. For your copy, just send 10c to cover postage and handling to O.K. Kelly, Classified Adv. Mgr., Dept. 530, Popular Science, 355 Lexington Ave., New York 17, N. Y.

ADVERTISE: 24 words, 100 Canadian Newspapers, \$5.50. Lists Free. Advertising Bureau, 10511-P Springfield, Chicago 55.

SOMETHING to sell? Write us about it and let us help you with a classified ad which will reach 7 million potential customers in the classified Opportunities section of this magazine. Include literature or samples if possible. Write today to O.K. Kelly, Classified Adv. Mgr., Dept. 1000, Popular Science Monthly, 355 Lexington Ave., New York 17, N. Y.

54 CARTOONING, SIGN PAINTING, CHALK TALKS

"HOW to Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 1910, Pleasant Hill, Ohio.

LEARN Art and Cartooning. Guaranteed portfolio of 24 proven lessons only \$4.95. Southgate Press, 711 Empire Building, Birmingham, Alabama.

CARTOON Your way to success! Internationally known instructor, Raye Burns, will personally teach you to create original, salable cartoons at home. Cost of Course is very low. Write for free details. Raye Burns School, Box 3583-S, Cleveland 18, Ohio.

CARTOONERAMA Teaches you cartooning in a new 24 Lesson Course. Free Brochure. CFA, Box 263H, Branford, Connecticut.

55 TYPEWRITERS & OFFICE MACHINES

TYPEWRITERS. Business Machines Whole. i.e. Free Catalog. Continental Distributing Company, Box 71, Temple City, California.

MIMEOGRAPH! 3500 copies hourly—in colors! Details. Scheetz's, Sellersville, Penna.

56 RUBBER STAMPS & OFFICE SUPPLIES

1000 NAME and address labels in plastic box 88c. Three line pocket rubber stamp 88c. Satisfaction guaranteed. Jordan's, 552 West O'Connor, Lima, Ohio.

INDEXED Cushioned 3 Lines And Self-Inking Plastic Pocket Stamp With Same Wording. Both For \$1.50. S. D. Walker, P.O. Box 41, Orlobista, Fla.

FREE—Rubber Stamp Catalog. Martins, 1425 Major Drive, Jefferson City, Missouri.

ANY three lines in metal pocket case, \$1.50. Speed Stamps, P.O. Box 91, Akron 9, Ohio.

11c WORD. Minimum 66c. Newest 1960 Method. Engresser, Box 82, St. Peter, Minnesota.

THREE line pocket rubber stamp, self-inking. \$1.00. L. Watson, P.O. Box 162, St. Charles, Illinois.

DE LUXE—Desk set three or four lines plus pad and first line stamp \$1.00. Accra-Stamps, 6376 West Fork, Cincinnati 39, Ohio.

57 PRINTING, MULTIGRAPHING, ETC.

1,000 BUSINESS Cards, "Raised Letters" \$3.95. Samples. Pioneer, PS10, Island Park, New York.

FREE Catalogs. Postpaid printing, Rubber stamps. D M Press, Sebastopol, Calif.

OFFSET Printing—24 Hour Service—\$6.75—1000 8½x11, \$18.50—5000. National Letter, 300 West 43rd St., New York City 36.

COLORED or white 8½x11 offset. \$6.50—1000; \$18—5000. Fast! Flair, 10 West 45th, New York City 36.

OFFSET Printing, 1000—8½x11, \$5.50. Alpine, Box 676-PA, Cupertino, Calif.

BUSINESS Cards 1000—\$2.95. Rubber Stamps. Weiss, Box 8304, Kansas City, Missouri.

QUALITY Printing by mail. Stamp for samples. S. Cook, 818 West Gift, Peoria, Illinois.

PHOTO-offset. Samples, prices free. Litho, 53 Laurie, Ft. Walton, Florida.

100 6¾ Envelopes. 100 5½x8½ Letterheads printed, \$2.35. M. Fortney, R3, Dillsburg, Pa.

LETTERHEADS. Circulars, etc. Price list. Valaitis, 1705 South 2nd, Phila. 10, Pa.

FREE Catalog, samples, 1000 business cards \$3.95. Rubber stamps. Youngers Printing, Princeton, Iowa.

500 ¾x2¼ Four Line Stickers \$1.00, Red Border \$1.50. Moritz, 312 Tuscola, Saginaw, Mich.

250 8½x11 HAMMERMILL Business Letterheads \$2.95. 250 Envelopes \$2.95. Samples. Davis, 7609 Spruce Road, Baltimore 22, Maryland.

1000 RAISED business cards, \$3.75. Speedy service. Samples. Alro, Box 566, Nyack, New York.

1000 GUMMED Name & Address Labels \$1.00. Perk's, Essex, Mass.

250 EACH—Business cards, envelopes, 5½x8½ letterheads and billheads—\$8.75. "Business Starter." Art Printing, Box 1515, Winston-Salem, North Carolina.

SUPER Offset — 8½x11 — \$4.85 — 1000. Business Cards Raised — \$3.50 — 1000. Graphic, 780 Main, Hackensack, New Jersey.

RAISED Letter Business Cards, like engraved, \$3.00 thousand. Free samples. Kavanagh, 607 Knickerbocker Ave., Brooklyn 21, N. Y.

250 8½x11 LETTERHEADS and 10 in. envelopes \$5.95. Davies, 187 Austin, Old Bridge, N. J.

58 PRINTING OUTFITS, SUPPLIES

PRINTING Outfits, type, supplies. Send dime for illustrated supply book and samples. Kelsey, Inc., H-8, Meriden, Conn.

PRINTING Presses, Type, Supplies, Lists, 4c. Turnbaugh Service, Mechanicsburg, Pa.

MAKE Your Own self-molding rubber stamps and printing cuts. Plexirubber, Argyle 2, Wisconsin.

RUBBER Stamp Presses, Hydraulic Operated. Electrically heated. Sizes 5"x8", 8"x12", 10"x15", starting outfits, supplies, Printing Presses, Custom Manufacturing, 507 N. Jefferson, Springfield 2, Missouri.

TYPE for printers and rubber stamp makers. Send 25c for big new 96 page catalogue. Largest selection in U.S. Acme Type, 633 Plymouth Court, Chicago 5, Ill.

RUBBER Stamp Presses, Supplies. Kiewiet, 2025 Barney Road, Kalamazoo, Michigan.

TYPE cases, cabinets. Manufacturer. Catalog. King McKay Company, 23179 Telegraph, Southfield, Michigan.

WHOLESALE: Envelopes and Paper. Price List 50c. Sample Unit \$2.00. United States Color Corporation, Box 2850, Grand Central, New York 17, New York.

60 FOR INVENTORS

WE have the markets if you have the ideas. Harvey Engineering, Cambridge 1, Maryland.

INVENTORS, if you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 30A, 635-F St., N.W., Washington 4, D. C.

INVENTIONS needed immediately for manufacturers. For additional information write Kessler Corporation, C-710-PI, Fremont, Ohio.

INVENTORS! Why be broke? Turn your invention into cash. If saleable, we can sell it. Write Universal Inventions, Box 298, Marion, Ohio.

NEW Toy Ideas Wanted:—We Have Markets For Good New Toys. Outright Purchase Or Royalty. Will Be An Art Linkletter Product. Link Research Corp., 9460 Wilshire Boulevard, Beverly Hills, California.

PATENT Searches including copies of nearest patents. \$6.00. Reports airmailed within 48 hours. More than 200 registered patent attorneys have used my service. For Free invention protection forms. Write Miss Ann Hastings, P. O. Box 176, Washington 4, D. C.

INVENTORS' Complete Service. Cash-Royalties Sales. Inventions Researched. Patent Development Engineering. Free Invention Certificate. George Spector, Licensed Invention Engineer, 3615 Woolworth Building, New York.

SAVE! New Inventor's Patent Kit makes it easy to apply for patents yourself. Free "Registration Form." Miss Suzanne Blaine, 306 Carry Building, Washington 5, D. C.

YOU can easily apply for patents. Save with complete professional kit, featuring "Exclusive Demonstrator Method" and fill-in forms. Free Registration Certificate. Patent Associates, 1213 Commonwealth Building, Philadelphia 7, Pennsylvania.

PATENT Searches, including complete copies of related patents, \$6.00. Inventors, attorneys, manufacturers use my original "World-Wide" Airmail service. "Proof of Invention" protection form and "Information Every Inventor Needs" sent free! Miss Jane Hayward, 1029 Vermont Avenue N.W., Washington 5, D. C.

INVENTIONS Wanted for immediate promotion! Patented; unpatented. Outright cash; royalties! Casco, Mills Building, Washington 6, D. C.

PROFESSIONAL Patent searches, \$1.00, complete with report and related patent copies. Complete patent and trademark services. Free Forms; write: Congress Invention Institute, 210C McKim Building, Washington 5, D. C.

PATENT Searches, \$6.00, complete with comprehensive report and Official Patent Office copies of related patents. Certified. Airmailed. For free "Invention Protection Form", and "Patent Information", write: U.S. Inventors Service Bureau, Headquarters Building, Washington 6, D. C.

PATENT Searches, \$5.00, including patent copies. Reliable reports. Same accurate search as conducted for attorneys. Free protection forms. 15 years dependable service. Patent Service Institute, 845-B Pennsylvania Avenue, Washington 4, D. C.

INVENTORS: Save time and money. Our complete "Patent Kit" makes it easy to prepare and file your own patent application. Free "Registration Certificate." National Inventors Service, Box 88, Ben Franklin Station, Washington, D. C.

QUALITY Patent Searches, \$6.00. Copies of closest patents forwarded. Free "Protection Certificate." American Patent Search Co., 422 Washington Bldg., Washington 5, D. C.

INVENTIONS Sold: Patented and Patent Pending Write: Kenwal Enterprises, Box 584, Watertown, South Dakota.

POPULAR SCIENCE OPPORTUNITIES

PATENTS Skillfully Prepared for maximum commercial value with useful product development. High record of success in proving and claiming patentability. Valuable market service. Patents prepared and filed for service free as low as \$200.00. Send for self protecting invention record forms free. Patent search with valuable engineering report \$15.00. Foreign patents filed at lower cost. Thirty Years established. Joseph O'Brien, Patent & Development Engineer, 132 Nassau Street, New York 38, N. Y.

INVENTORS! Determine patentability of your invention. Searches of the Patent Office Records administered professionally—\$6.00. For free invention protection forms, dependable service write Washington Patent Office Search Bureau, 1426 G Street, N.W., Washington 5, D. C.

INVENTORS! Outright cash sale or royalties for your inventions. Patented. Unpatented. Constant demand from our client manufacturers. Write United States Invention Brokerage, 78 Wall Street, New York 5, N. Y.

PATENT searches including copies of closest patents \$6.00. Quality searches expertly administered. Free Protection Forms. Write Professional Patent Office Search Bureau, 412 Albee Building, Washington 5, D. C.

DON'T pay high fees! Obtain U. S. Patent yourself. It's easy with "Professional Kit with Fill-In Forms." Free "Registration Form." Patent Protection Institute, 2000 P Street, N.W., Washington 5, D. C.

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Inventions on Demand, 79 Wall Street, New York 5, N. Y.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 80 Wall Street, Financial District, New York City.

61 INVENTIONS WANTED

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Inventions on Demand, 79 Wall Street, New York 5, N. Y.

INVENTORS! Outright cash sale or royalties for your inventions. Patented. Unpatented. Constant demand from our client manufacturers. Write United States Invention Brokerage, 78 Wall Street, New York 5, N. Y.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information free. Institute of American Inventors, Dept. 30C, 635-F Street, N. W., Washington 4, D. C.

ARE you interested in offers from reliable manufacturers for your invention? Patented, unpatented. Harvey Engineering, Cambridge, Maryland.

INVENTIONS wanted. Patented; unpatented. Tremendous Manufacturers lists. Global Marketing Service, 2420 77th, Oakland 5, Calif.

INVENTORS! Don't sell your invention, patented or unpatented, until you receive our offer. Write Universal Inventions, Box 298 Marion, Ohio.

INVENTORS—Get The Best Offer First! Patented or unpatented. Write Carl Sommer, Director, Industrial Invention Sales, 3136-B Sylvania Ave., Toledo 13, Ohio.

INVENTORS needing help with any problem, financial, development, securing manufacturer, obtaining patent. Write the organization that delivers action and results—not promises. Pioneer Inventions, 150 Broadway, New York 38, N. Y.

INVENTIONS Wanted: "Patented"—"Patent Pending." 29 Years experience Promoting Inventions. National Service Bureau, 3122 Meramec, St. Louis 18, Missouri.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 80 Wall Street, Financial District, New York City.

INVENTORS—Do you want to sell or license your invention on cash or royalty basis? Write Kessler Corporation, C-710-IW, Fremont, Ohio.

INVENTORS' Complete Service. Cash-Royalties Sales. Inventions Researched. Patent Development Engineering. Free Invention Certificate. George Spector, Licensed Invention Engineer, 3615 Woolworth Building, New York.

INVENTIONS Wanted for immediate promotion! Patented; unpatented. Outright cash; royalties! Casco, Mills Building, Washington 6, D. C.

INVENTIONS Wanted for Manufacturers. Free Details. Write Allen, Dept. D, 712 Davis Bldg., Big D, Dallas, Texas.

MANUFACTURER seeks new items for medical, surgical, hospital field. Write: Suite 618, 565 Fifth Avenue, New York 17, N. Y.

64 MODELS, MODEL SUPPLIES

POWER Models. Unusual steam, gasoline and traction engines, fittings, metals. New comprehensive, 100 page catalog \$1.00. Hot off press! Charles Cole, Ventura, Calif.

SHIP Models. Most complete line in New England. Kits, fittings, plans, books, tools, engines, motors. Illustrated catalog 35c. James Bliss and Co., Inc., Dept. PS, 342 Atlantic Avenue, Boston 10, Massachusetts.

"POWER Drives Handbook"—36 pages illustrating many types motor drives for model autos, boats, displays, turntables, etc. Mail 25 cents cash, returnable first order \$3.00 or more. Wilson's of Cleveland, Dept. PS, P. O. Box 8995, Ft. Lauderdale, Fla.

SHIP and yacht model fittings; blueprints. Send 40c for illustrated catalog listing hundreds of items. A. J. Fisher, Inc., 1002-2 Etowah Ave., Royal Oak, Michigan.

SCALE Model materials for building model homes and architectural buildings of any type. 1/4" and 1/8" scale. Send 50c for catalog. A & B Model Builders, 454-F Donovan Road, Kansas City, Kansas.

SHIP Model Kits and fittings: clippers, frigates, etc. Catalog, paint-tool list, book list, 25c. Model Shipways, Box 85, Bogota, N. J.

ROCKET Supplies. Nozzles. Cones. Tubes. Specials Also Made. Catalog 10c. Sky Mfg. Co., Mineral Point, Pa.

FREE! 12 metal fittings with sleek 18" Chris-Craft scale model speedboat kit at \$5.95 postpaid. Includes diecut wood parts, mahogany deck. Dumas Products, Inc., Box 6096, Tucson, Arizona.

ROCKET Powered Micro-Miniature Ballistic Missiles. Complete illustrated instructions on assembly and firing using common materials available everywhere. Send \$1 to Dept. 1A, Box 171, Carnegie, Penna.

64B ELECTRIC TRAINS

LIONEL Trains Big Discounts Catalog 25c. Mack Bros., 2041 Chicago Ave., Chicago 22.

65 HOME CRAFTSMAN

WALNUT, Cherry, Silver Maple, kiln dried Lumber, Squares Blocks and Picture Frame Moulding. Midland Lumber Co., Box 262, Savannah, Mo.

UNUSUAL Crafts for Cub Scouts. Free literature. Cub Crafts, Box 381, Alameda, California.

FREE "Do-It-Yourself" Leathercraft Catalog. Tandy Leather Company, Box 791, S36, Fort Worth, Texas.

LEARN Jewelry Making at home. Inexpensive Art Metalcraft course teaches how to make all types cuff links, earrings, tableware, etc. of silver, gold, copper. Send postcard for free booklet. Interstate Training Service, Dept. L-2, Portland 12, Oregon.

GRANDFATHER clock movements, case plans, kits. Wholesale catalog 25c. Mason-Sullivan, Noroton 2, Conn.

FREE. New Catalog. 2447 Plans, Patterns. World's greatest selection things to do. Make. Fun. Profit. Craftplans, 1322-B Wabash, Chicago 5.

FOUNDRYETTE. 2400° F. 1 1/2 to 48 lb. capacity. Free Circular. Kansas City Specialties Co., Dept. S-10, Marysville, Kansas.

89 JIG saw patterns. Beautiful shelves, Ornaments, Novelties. Plus "How Where to Sell" \$1.00. Mastercraft, 104S, 7041 Olcott, Chicago 31.

FREE Leathercraft Catalog — Quality Kits, Leathers, Tools. Handicrafters, Montrose, Calif.

WHAT'S new in leathercraft? Complete catalog, 10c. Larson, Dept. 1126, 820 S. Tripp, Chicago 24.

WONDERGLUE—New Amazing Waterproof Adhesive. Guaranteed to stick anything to anything. 2 Oz. tube only \$1.00 postpaid. Bard's Products, Box 831, Evanston 1, Illinois.

!!FREE!! Leathercraft catalog. Hundreds of new items. Write MacPherson Bros. Leather Company, Dept. A, 730 Mission St., San Francisco 3, Calif.

MAKE Glueing, Laminating, Forming Press For \$3.00. Handles Work To 20" Square. Plans \$1.00. Edward Cook, Martin Avenue, Saratoga Springs, New York.

KNOCKDOWN cedar chest and lumber. Please send 25c for catalog. Bedford Lumber Company, Shelbyville, Tennessee.

66 DO IT YOURSELF

MAGNETS assorted dozen \$1.50. Ronald Eyrich, 12730 Robin, Brookfield, Wisconsin.

DRILL Your Own Well; For Information Write Roy Vulgamore, R7, Chillicothe, Ohio.

REUPHOLSTERING Simplified. Restyling, Recovering, Repairing. 35c. Hart Co., Payne, Ohio.

67 OLD GOLD, JEWELRY, WATCHES, ETC.

USED and new watches \$2 up. Free List. Southern Watches, 5-PS So. Wabash, Chicago 3.

FREE catalog. Costume jewelry parts. Supplies. Reasonable prices. Fast service. Guaranteed quality. Unique merchandise. Folsom's, Box 52, Medford 55, Massachusetts.

HIGHEST Cash For Old Gold, Jewelry, Gold Teeth, Watches, Diamonds, Silverware, Spectacles, Platinum, Mercury. Free information. Rose Refiners, Heyworth Bldg., Chicago 2.

HIGHEST Cash Paid For Old Gold, Jewelry, Gold Teeth, Diamonds, Watches, Silver. Mail Articles Today. Information Free. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 2357, Chicago 3.

COSTUME Jewelry Supplies. Settings. Rhinestone, etc. 88 page illustrated catalog, 30c. Milady, Box 1328 G.P.O., New York City (1).

WHOLESALE Quality Jewelry Findings: Chains: Charms: Fraternal, Religious Emblems. 100% satisfaction guaranteed! Catalog 10c, refundable. PS-10-60, Caraday, Box 22, West Hempstead, New York.

10 SWISS Watches \$18.00. Catalog 25c. Berkowitz, 1150 Castlehill, New York City 62.

68 TOBACCO & PIPES

HALF-OUNCE tobacco, pipe catalog, 10c. Hobert, 340 East Park, Huntington, Indiana.

GENUINE imported handcarved block Meershaum Pipes, Sultan's head \$14.95; plain \$9.95; set \$22.50. Order from Meershaum, 5327 McKinley, Bethesda, Maryland.

70 OF INTEREST TO WOMEN

LADIES: Earn up to \$2.00 hour sewing babywear! No house selling! Send postcard to Cuties, Warsaw 14, Indiana.

MAKE \$25 to \$35 weekly addressing envelopes. Our instructions reveal how. Glenway, Box 6568, Cleveland 1, Ohio.

15 100 100 10

This One



1FUB-U96-13S5

POPULAR SCIENCE OPPORTUNITIES

DRESSES 24c; Shoes 39c; Men's suits \$4.95; trousers \$1.20. Better used clothing. Free catalog. Transworld, 164-H Christopher, Brooklyn 12, N. Y.

MAKE Money weaving rugs at home for neighbors on \$89.50 Union Loom. Thousands doing it. Booklet free. Union Loom Works, Dept. 4, Boonville, N. Y.

CANDLEMAKING & Decorating. Terrific Hobby. Great Business. Learn fascinating molding, dipping, creating and decorating candles for year-round demand—holidays, birthdays, weddings, anniversaries. All Events. Spare time fun & extra income now. expand to colorful candle shop later. No age limit. Write for Free Facts on home instruction method. Candlecraft Institute, Dept. X168, Fallbrook, Calif.

HOME Typing: \$65 week possible! Details, \$1. Treasury, 709 Webster, New Rochelle PS-1, N. Y.

FREE Health Catalog lists 150 items that save you up to 50% and help your health problem too! Vitamins, Medicated Creams, Foot Comfort Aids, preparations for Piles, Asthma, Psoriasis, Athlete's Foot, Eczema, etc. Buy finest quality products in confidence without embarrassment at huge savings. Biosol, Dept. 107, 401 Broadway, N.Y.C.

CANDLEMAKING simplified. Easy to follow instructions using our many candle molds. Catalog free. Barker Enterprises, Dept. P, 5944 36th S.W., Seattle 6, Washington.

EXCELLENT income possible mailing advertising literature for growing organization. Literature, lists, stamps given free. Information \$1.00 (Refundable). Continental Mailers, Box 5523, Philadelphia 43, Pa.

71 FOR SALE MISCELLANEOUS

YOUR Name Embossed On Adhesive Vinyl Plastic. Personalize Tools, Luggage Etc. Colors Red, Green, Brown, Blue. 8 for \$1. Donadio, 130 Harvard St., Medford, Mass.

AMAZING new Checkwriter, lasts a lifetime, does the work of machines costing up to \$500.00, yet weighs just ten ounces. Only \$9.95. Send check or money order to John T. Benjamin, Box 75637, Sanford Station, Los Angeles 5, California.

GRANDMAS Nativity transparencies, also postcards. Handmade. Sample—catalogue 25c. Marquardt, Arkville, N. Y. Delaware County.

PHOTO Christmas Cards with matching envelopes from your negative or photo, 25 for \$1.50 postpaid. Send 10c for samples. Kwikie Pix, Dept. P, Box 27618, Los Feliz Sta., Hollywood 27, Calif.

72 WANTED TO BUY

CASH for used correspondence courses. Send description. Elmer Wall, Byars, Oklahoma.

QUICKSILVER, platinum, silver, gold. Ores analyzed. Mercury Terminal, Norwood, Massachusetts.

73 WEARING APPAREL

SKYSCRAPER-HEEL Shoes! Photo Catalog. \$1.00. Finecraft, Box 442-Y, Hollywood 28, Calif.

REAL Five Inch Heels—beautiful opera pumps—dollar brings picture and details. Ruspee, Box 209, West Hartford, Connecticut.

74 RAZOR BLADES, SHAVERS

FOR Shaving Luxury; Try 3 Each of World's Seven Finest Blades \$1. Persila, 436 N. Y. Ave., Brooklyn 25, N. Y.

75 TATTOOING SUPPLIES

LEARN profitable, fascinating Tattooing. Illustrated Information \$1.00. Zeis, 728-B Leslie, Rockford, Illinois.

77 TREASURE FINDERS & GEIGER COUNTERS

TRANSISTOR Treasure Detectors, underwater detectors. Many models. Free catalog. Gardiner Electronics Co., Dept. 1, 2545 East Indian School, Phoenix, Arizona.

DISCOVER buried loot, sunken treasure, gold, silver, coins; battlefield and ghost town relics, with powerful transistorized locators pioneered and perfected by Goldak. Low as \$79.50. Free, exciting information; literature on maps. The Goldak Co., 1540 West Glenoaks Blvd., Glendale 1, California.

SEARCHING For Treasure? Transistorized electronic M-Scope locates it. Lightweight. Guaranteed. From \$59.50. Easy Terms. Free Catalog. Fisher Research, Dept. C-2, Palo Alto, Calif.

TREASURE Map of the Gulf of Mexico, Caribbean Sea and West Indies showing 325 Authentic Locations. \$2.95. F. Rowland, 11215 N.E. 8th Ave., Miami 38, Florida.

GOLD-Silver Detectors. Latest types. Five models including transistors. Violites for tungsten, etc. Geiger Counters. No finer instruments anywhere. Free information. Detectron, Dept. 44, Sylmar, Calif.

TREASURE! Map, Handbook 25c. Locators. Howe, 811 Kansas, Atchison, Kansas.

78 WATCH REPAIRING

WATCH Makers! Beginners! Watch Movements, Material. Max Present, 21 East Van Buren, Chicago 5, Illinois.

WATCH and clock repairing books. Free catalog. North American, 2320-BX, Milwaukee, Chicago 47, Illinois.

WATCHMAKERS' Tools, Materials, Supplies. Watches. Catalog. Gales, Box 1000, Chicago 90, Illinois.

WATCHMAKERS' Jewelers', Lapidaries' Catalog 25c. Bengal, 8912 Venice, Culver City, California.

WATCHES repaired, cleaned, \$3.95 guaranteed. Lan's, 17 South Center, American Fork, Utah.

79 MISCELLANEOUS

LOANS Entirely By Mail—\$600 or Less. Strictly confidential. Repay in 24 monthly payments. Write: Budget Finance Co., Dept. I-90, 114 S. 17, Omaha 2, Nebr.

RECEIVE mails, magazines, samples. Your name in numerous mailing lists 25c. Greenwood, Box 1116-YT, New York City 8.

FREE Antenna with instructions. Experiment with Nature's electronics. Stillwater, Box 317-K, Morris Plains, New Jersey.

COLORCADE Water Fountain, Automatic Stroboscopic Color Effects. 809 Delaware, Berkeley, California.

ORNAMENTAL Iron designs. Book of 1600 beautiful, practical designs for railings, columns, etc. Free literature. Cunningham, 3881 South 3200 West PS-31, Salt Lake City 4, Utah.

SEND for Free Handy Catalog and Free Gift Offer. Suburban, 228 Blueberry, Hicksville, New York.

SEND \$1.00 for addresses of fifty companies that will send free booklets on every thing from where you can get free land to job placements, etc. Tommy Ward, P. O. Box 293, Buna, Texas.

STOP Buying Vitamins until you compare prices and formulas of all leading brands in our new catalogue. Save 50%. Mention Vitamins now using for free sample. Vitamin Specialties, Box 4435-C, Philadelphia 40, Pa.

HOMEBREWS. Potent Wines, Beers. 5c Quart. European Methods. Easy. Illustrated Instructions \$1.00. B&W Books, Delaware City 10, Del.

RECEIVE Mails—Offers From Everywhere. Samples, Catalogues, Magazines, Bargains. Get Listed 25c. Rorick's, Cincinnati 26, Ohio.

OPPORTUNITIES—Bargains—Services!! That's what you find in these classified advertising columns. Advertisers here offer numerous products, services and opportunities. Read the ads. You may find just what you have been looking for. You can make or save money by answering these ads. (Write directly to the advertiser—not to Popular Science.)

MAKE Wines, Brandies, Cordials, Beer. Full Instructions. Trade Secrets \$1.00. Rorick, Cincinnati 26, Ohio.

IF you have a product or service that can be operated on a mail order basis, don't fail to read the new booklet, "How to Make Money Through Classified Advertising." It contains scores of valuable hints on product selection, media selection, copywriting, keying, etc. Just send 10c for your copy to O.K. Kelly, Classified Adv. Mgr., Dept. 790, Popular Science, 355 Lexington Ave., New York 17, N. Y.

10 SPICY Sharple Cards—samples Devil name cards, 25c. Excelsior Press, Box 397, Lynnwood, Washington.

BOOKS on antiques and their prices. Free circular! R. Warman, Publisher, Uniontown, Penna.

ELEVEN Keys to Power, Health, Love, Happiness, Success, Control Others. Only \$1.00. Roricks, Cincinnati 26, Ohio.

80 PERSONAL

MONEY Management Through Systematic Budgeting. "The Master Budget System." Only \$2.00; money back guarantee. Master Budget System, P. O. Box 448, Falls Church, Virginia.

MEXICAN Legal Matters. A. Espejo, Box 217, Tijuana, Mexico.

"RULE Others with your Thoughts." Telepathy. (Adults.) Write: Clarion, Box 9309-S6, Chicago 90.

HAVE You Ever Seen A Bald Coal Miner? Use Headlite Brand Of Refined Coal Oil. Grooms Hair, Aids Dry Scalp. Pleasant "He-Man" Odor. Big 6 oz. Bottle \$1.00 Postpaid. Headlite Products, Box 569, Glen Cove, N. Y.

RUPTURED? No leg straps. No elastic. No pressure on hip or spine. Inexpensive. Guaranteed. Write Hand-Lock Products, Preston, Ontario, Can.

MILLIONS Of Dollars are waiting for somebody in abandoned bank accounts. Write today for names and addresses. You might be the person the banks are looking for. Send \$1.00 for your complete catalog to National Bank Publications, Box 344, Buffalo 5, N. Y.

PSORIASIS Sufferers: Discouraged? Here's help! You pay nothing unless satisfied. Free details. Pixacol, Box 3583-SP, Cleveland 18, Ohio.

\$1,000 IN savings tomorrow? \$1 tells how. Phillips, 14018 Santa Teresa, Houston 45.

YOU can win contests. Send \$1.00 for folio, "How to Write and Prepare Original Entries," to J. C. Lovell, 327 Steilen Ave., Ridgewood, New Jersey.

SUPER memory overnight! Success guaranteed! Bijou, Box 1727-V, Hollywood 28, Calif.

LOANS By Mail. \$50 to \$600 For Any Purpose. Confidential. 2 years to repay. Write for free loan application. American Loan Plan, City National Bldg., Dept. PS-9200, Omaha 2, Nebraska.

80A REMAILING SERVICE

MIAMI—25c, \$2.50 per month. Spillers, P.O. Box 34-668, Coral Gables, Florida.

REMAILS 25c, Monthly \$3.00. Sunday Classifieds \$1.00. CheRon, Box 6311, St. Louis, Missouri.

SECRET Mail Address. \$3 Month. Hedg-peth, Box 830, Alhambra 24, California.

MAILING, Receiving, Forwarding, \$3.00 month. "A-1", 170 Fifth Ave., New York 10.

80B LOANS BY MAIL

BORROW \$50 to \$600 By Mail. Quick, Easy, Private. No Co-Signers. Repay in 24 small monthly payments. For the amount you want write today to Dial Finance Co., 410 Kilpatrick Bldg., Dept. K-1, Omaha 2, Nebraska.

BORROW By Mail. \$100-\$600. Anywhere. Air Mail Service. Postal Finance, 200 Keeline Building, Department 11, Omaha 2, Nebraska.



**TURN YOUR HANDS, FINGERS,
ELBOWS & FEET INTO SUPER WEAPONS!**

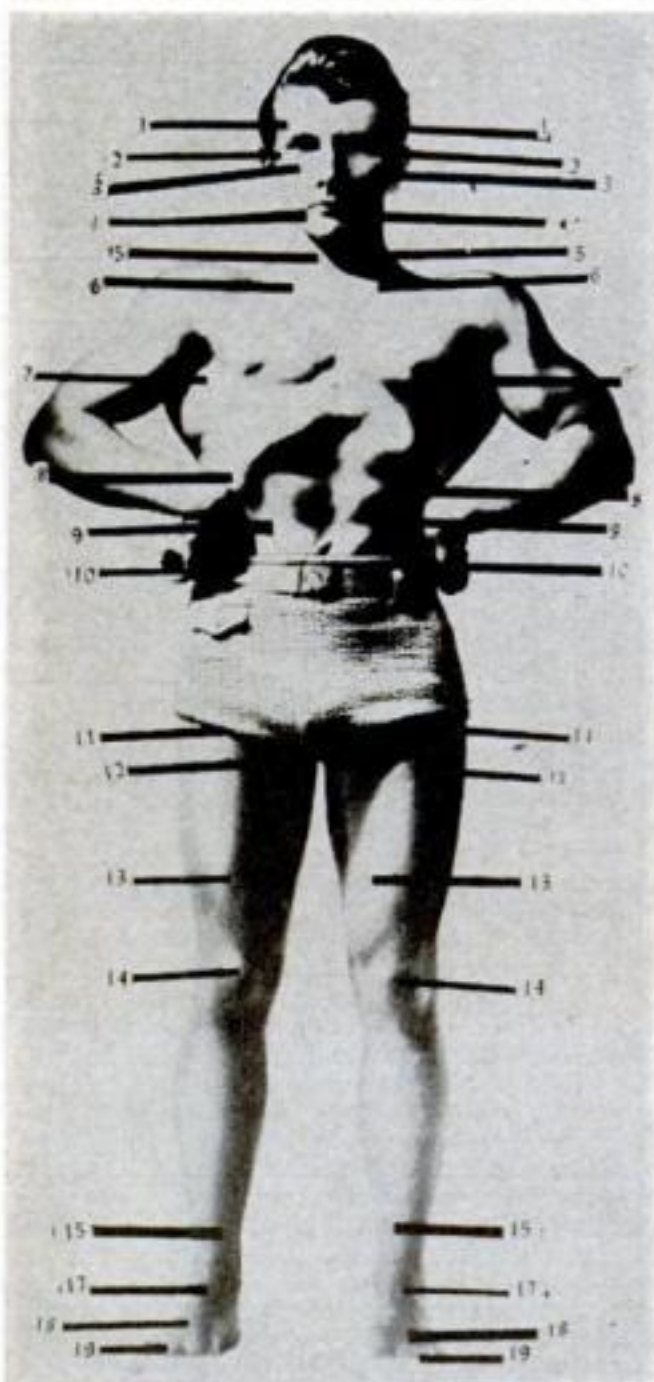


**WITH EASY
TO LEARN**

KARATE

**QUICKER, BETTER
THAN JUDO!**

**FEAR NO ONE! WITH KARATE A 98 POUND WEAKLING CAN EASILY
OVERPOWER A 220 LB. HE-MAN IN SECONDS WITH HIS BARE HANDS!**



Karate will teach you all around self defense in weeks. It can be learned at home—alone. It is the traditional Oriental method for dealing with malicious and armed attack. Its objective and function is to disarm, subdue or cripple an enemy who may come unexpectedly out of the dark. It makes you the equal of any man of any weight or experience. It teaches you instantaneous, automatic defense against the most unexpected attacks. Karate is a weapon no man can take away from you. Once you know Karate, you will fear no mugger, you'll not be shamed by some street corner gang insulting your girl as you pass. You need nothing but your hands and feet, and a reasonably limber constitution. The more violent and brutal the attack upon you the more effective your defense. Profusely illustrated with actual combat photos, and anatomical charts of man's nerve centers, pressure points, and weak spots. Defense against injurious holds and blows explained by some of America's leading experts, including masters of Judo recognized among the topmost masters of Japan. Until recently Karate technique was kept secret and originally used only for the Emperors' guards. The Japanese police and Army combat troops use KARATE to subdue criminals and in the battlefield. For the firsthand knowledge, ask some friend who fought in the Pacific! Now, adapted to American athletic standards and techniques, you can learn the fundamentals of this master defense by yourself, at home, in weeks.

Devised by the ancient Japanese Professionals, Karate is the self-defense Hand-to-Hand combat system that is faster, more effective than Judo. Karate has been used in Japan for hundreds of years! Karate was published with action-packed photos teaching you how to handle gun and knife attacks, street fighters and muggers.

You will learn just where the Karate striking points and positions are. You will learn the best defense against annoying attacks and serious attacks. In this very well illustrated book you are taught by one of the outstanding authors on Karate technique and everything is simplified, explained and shown so that you can more easily master the art. The anatomical charts show the pressure points for fatal, serious and mild blows. You'll see how easy it is to render your opponent completely helpless. You'll never know how *confident* you will feel even among men much *bigger* than *you* are until you learn Karate. *With this book* you will fear *no man*. You will turn your feet, your elbows, fingers and your hands into such super weapons that it will amaze you and your friends. Learn Karate self defense now! You never know when you need it! *It's for men and women.*

**Karate teaches you the
pressure points, etc., of
your opponent so that you
can render him absolutely
helpless in seconds.**

SOLD ON MONEY BACK GUARANTEE

After receiving this Karate technique Book look it over, it must do everything this advertisement promises, it must raise your confidence in your ability. Physically, it must teach you more about self defense than you ever knew before or you get your money back! Don't delay, order now on this money back guarantee. Mail coupon *now!*

**BEST VALUES CO., Dept. W-77
403 Market St., Newark, New Jersey**

- ☐ Rush my copy of Karate Technique. I Enclose \$2.98, Send Postage Pre-Paid. My money will be refunded if not satisfied.
- ☐ Send Deluxe Hard Cover Edition. I enclose \$5.00, Send Postage Pre-Paid. My money will be refunded if not satisfied.

NAME _____

ADDRESS _____

CITY _____

STATE _____



There's more to winterizing than meets the eye!

Winterizing calls for a specialist! Your General Motors Dealer is best qualified because he knows your GM car or truck best. His servicemen are *factory-trained* in the Guardian Maintenance methods. They know the correct thermostat and pressure for the cooling system of your car or truck to deliver faster warm-ups for greater gas economy, and better heater and defroster performance.

With Guardian Maintenance, you get a clean, efficient cooling system. You get the needed anti-freeze to compensate for your climate—plus the anti-rust to combat corrosion. And you get carefree motoring for the winter months to come. Now is the time to take your GM car or truck to your General Motors Dealer for a cooling system winter change-over with his all-inclusive Guardian Maintenance.

See your
CHEVROLET • PONTIAC • OLDSMOBILE
BUICK • CADILLAC • GMC

Dealer for

> Guardian
Maintenance

BEST KIND OF CARE FOR THE BEST CARS AND TRUCKS!



THAT NEW 1961 OUTBOARD
IS WAITING FOR YOU AT
YOUR GALE DEALER'S NOW!

ready to go
...reliable Gale!

Take the keys to a Gale outboard, add a boatload full of fun. Take a hankering for action and a liking for the sun. *That's living!* And a Gale belongs because it delivers the most important quality any outboard can have—*reliability*. Reliability that means happy cruises, fishing trips and skiing parties. Over 200 careful quality control checks during assembly plus

"Tank-Testing" of every outboard at the factory are your guarantee of solid reliability. Gale outboard owners tell us they'd never go back to any other brand. You won't either, once a Gale is part of your family. See the new 1961 Gale Sovereigns and Buccaneers now at your dealer's (he's in the "Yellow Pages"). Or for free brochure, write: Gale, Dept. 2100, Galesburg, Ill.

SEVEN SUPERBLY STYLED OUTBOARDS...DEDICATED TO QUALITY...ENGINEERED FOR FAMILY FUN



Electric starting
High-output factory-installed generator now available on Sovereign models—option

